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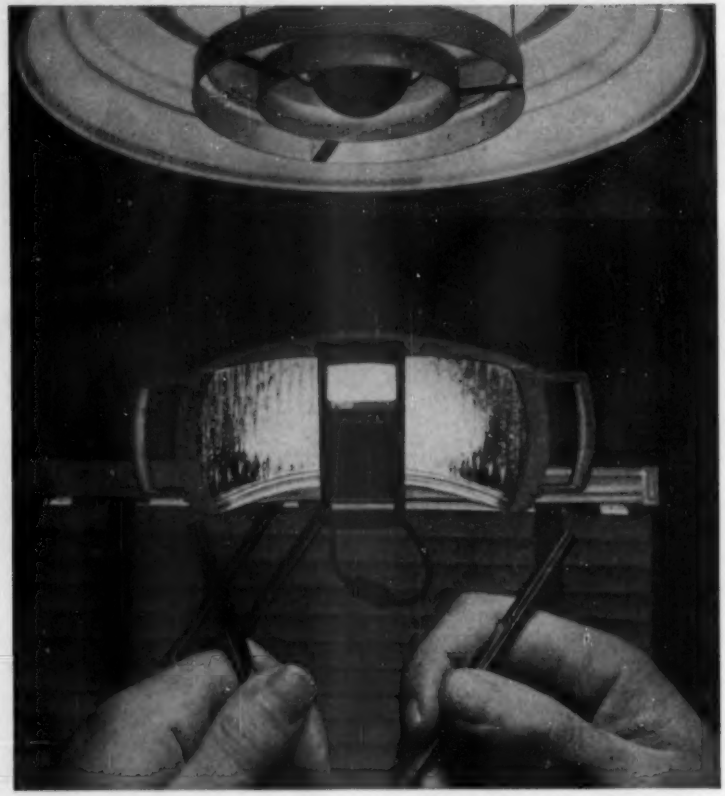

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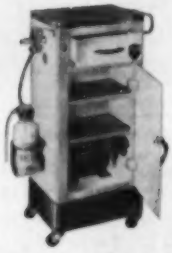

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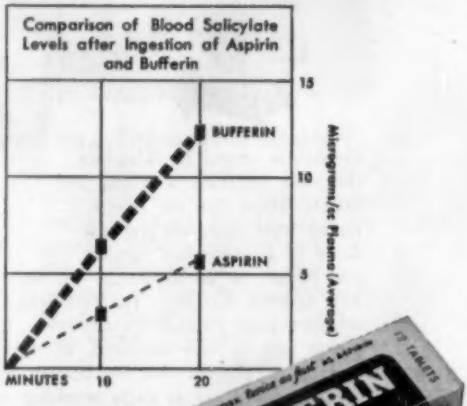

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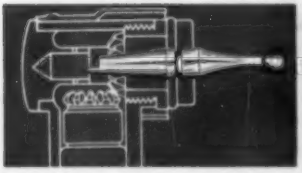

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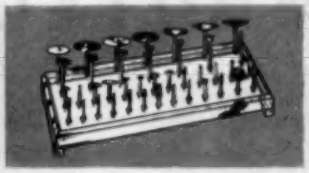

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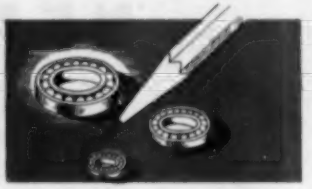

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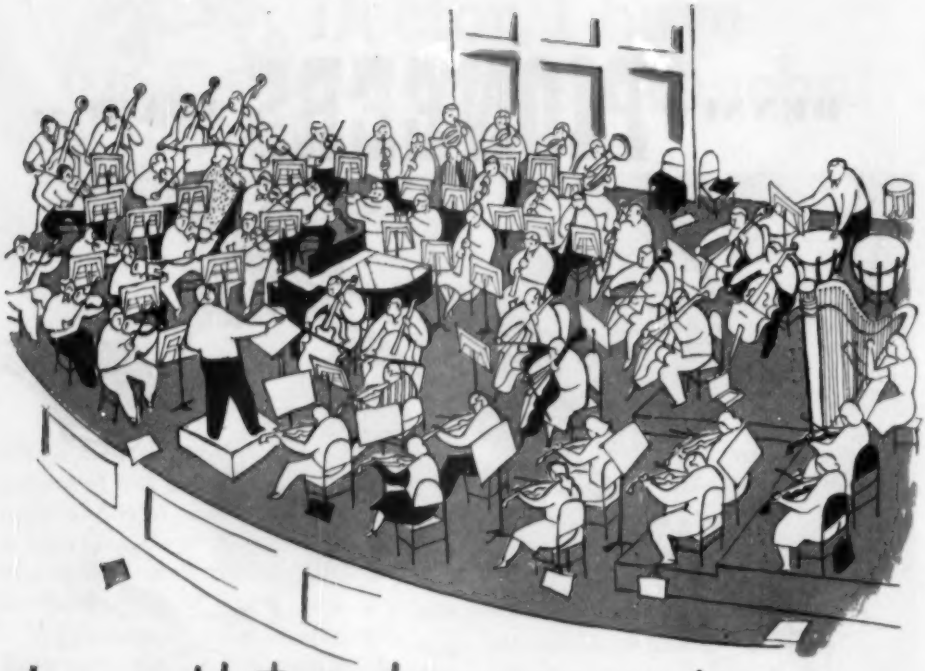

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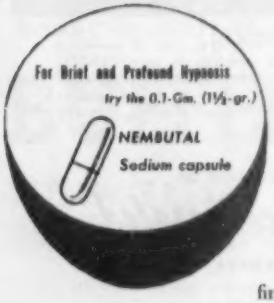

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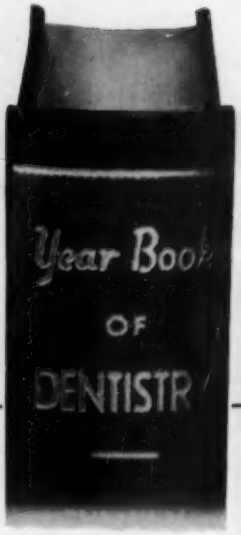

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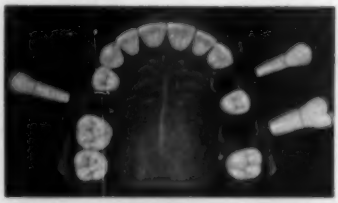

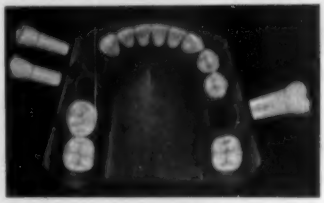

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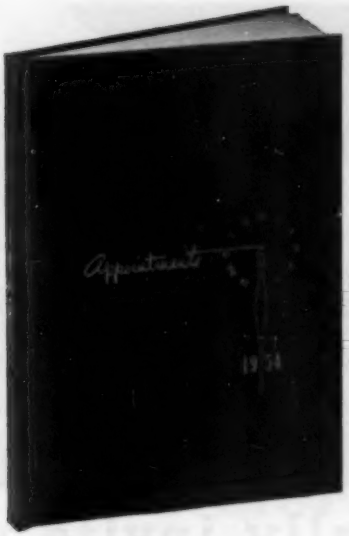

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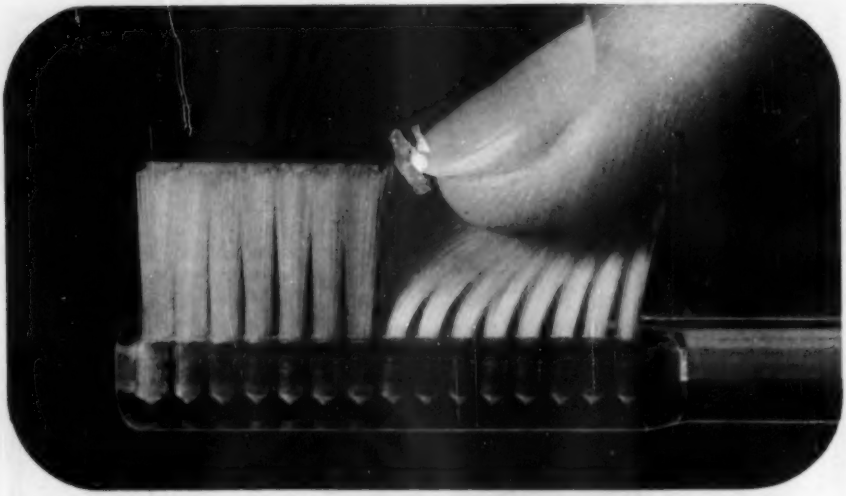

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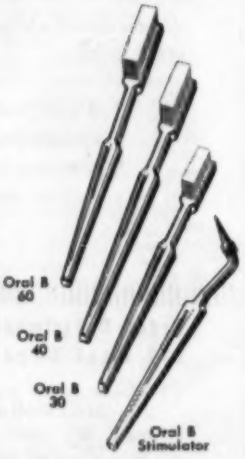

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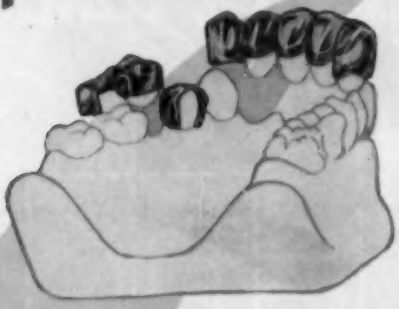

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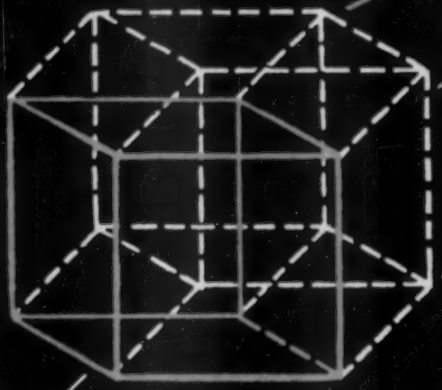

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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Therapeutic dentifrices: panel discussion

Theories regarding the anticariogenic effectiveness of therapeutic dentifrices are so many and the known facts so few that the Council on Scientific Sessions decided to air the subject fully at the ninety-fourth annual session of the Association last September. This it did by presenting a crowded half-day symposium entitled "Is There a Therapeutic Dentifrice?" Invited to participate in the discussion were five of the country's leading research men who had devoted years of study to the relation of dentifrices to mouth health. Thomas J. Hill, chairman of the Council on Dental Therapeutics, moderated the discussion presented by the five researchers: Helmut A. Zander, Robert G. Kesel, John W. Hein, Leonard S. Fosdick and Albert H. Kniesner. The papers, discussion and conclusions of the symposium, which present the latest information on this important yet elusive subject, follow:

INTRODUCTION

Thomas J. Hill, D.D.S., Cleveland

The purpose of the following symposium is to review the available evidence and attempt to correlate that which appears to be in conflict, to evaluate the results in terms applicable to clinical practice and to make this information usable for dissemination to the public. To accomplish this, a panel of five well qualified men has been assigned specific subjects.

It is not expected that a final analysis will be reached but it is hoped that this

Professor of oral pathology, Western Reserve University.

discussion will give a true picture, based on present information, of what might be expected from dentifrices with claimed or reported therapeutic value.

Generally speaking, dentifrices are considered by law as cosmetic agents and their value is that of an aid, used in conjunction with a toothbrush and water, for cleansing the accessible surfaces of the teeth.

They usually are made by the mixture of an abrasive, a detergent, a flavoring agent and substances necessary to make them desirable pharmaceutical preparations. If by reason of these properties they are successful in removing bacteria or food residue from the teeth and consequently reduce the caries incidence, they do so by reason of their cleaning or cosmetic value and should not be considered as therapeutic agents. In this case, they serve the same purpose as hand soaps in the prevention of infections of the hands by the removal of surface contaminations.

Therapeutic dentifrices are tooth-cleaning agents which have incorporated in them some drug or chemical which by reason of its bactericidal, bacteriostatic, enzyme-inhibiting or acid-neutralizing qualities reduces the incidence of dental caries or aids in the control of periodontal disease.

As long as there has been a history of medicine, there has been a history of the use of therapeutic dentifrices. During the greater portion of this time, it has been believed that dentifrices, both of a semisolid and liquid nature, have had some therapeutic value and that they were instrumental in the prevention and cure of dental disease. The periodicity of this therapeutic implication of dentifrices is a historic record and there is reason to believe that, until there is a better understanding of the causative factors of dental caries and periodontal disease, there will be constantly recurring attempts to control oral disease by these measures. Around the turn of the century, new impetus was given to the therapeutic claim of these products and some of the present dentifrices were named after what was believed to be their active therapeutic ingredients. This is evidenced in the name of Pepsodent which originally contained pepsin and was believed to dissolve or digest the mucinous plaques from tooth surfaces.

Another dentifrice named after its active ingredient was Ipana because it originally contained ipicac or its alkaloid emetine hydrochloride. This was believed to be specific for the *Endamoeba bucallis* which was then thought to be related to periodontal disease. These ingredients have long since been removed from these dentifrices, but their names still carry an implication that they contain a therapeutic ingredient.

After the period just referred to, there was a rather uniform belief that the value of dentifrices was confined strictly to their cleaning, scouring or detergent value and emphasis was placed on the development of better abrasives and better detergents.

Within the last few years there has been another wave of enthusiasm built around the theory that it might be possible to change the bacterial flora, or to neutralize the products of bacteria, so that the decalcification of teeth by the production of acids might be prevented. All of the recent dentifrices thought to have therapeutic possibilities have had this as their basic principle; this applies to ammonia, penicillin, chlorophyll and various other materials which might act either as bactericidal or bacteriostatic agents or as enzyme inhibitors.

Regardless of the effectiveness of these agents which are discussed in the following articles, it is probable that many new agents will in the future be promoted for the control of dental caries and periodontal disease. The present dentifrices and those to be promoted in the future will have to be judged critically on the basis of the scientific evidence available and

not on the basis of any popular appeal promoted in their behalf.

With the exception of the use of fluorine, all of the methods that have been suggested for dental caries control depend in part or in a large measure on the cooperation of the patient. It would appear then, that any method to control dental caries must be not only sound in theory and demonstrable by clinical investigation but also must be practical in office manipulation or effective under the usual and common conditions of home use.

ANTIBIOTICS IN DENTIFRICES

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The two major dental diseases, caries and periodontal disease, are bacterial diseases. Microorganisms are either the local exciting or the contributing factor.[1-3] The main weapons that are used today against diseases of a bacterial nature are antibiotics. This group of chemical substances possessing antimicrobial activity has received a tremendous amount of study in the last ten years. The bacterial spectra against which antibiotics are effective have been well defined. They include the microorganisms commonly associated with dental caries and periodontal disease. It is not surprising, therefore, that antibiotics are considered as therapeutic agents for these dental diseases. Would, then, the inclusion of antibiotics in dentifrices make them "therapeutic dentifrices"? It is the object of this presentation to review the available scientific data and to try to answer this question.

DENTAL CARIES

Animal Studies • In 1946 McClure and Hewitt fed 75 units of sodium penicillin per gram of diet, and the same amount per milliliter of drinking water, to rats. Control rats received the same diet and drinking water without the addition of penicillin. After 125 days the "penicillin rats" had no carious teeth while 50 per cent of the control rats showed caries. The authors came to the conclusion that since it was known that *Lactobacillus acidophilus* and other bacteria are associated with dental caries, and that since it has been shown *in vitro* that penicillin is an antibacterial agent for these microorganisms, their results suggest "a possible response of human dental caries to penicillin therapy."[4]

A similar study by Webman[5] and coworkers on rats, but one in which only five units of penicillin per milliliter of water was given and none in the food, was not able to confirm complete inhibition of caries in the same animal. How-

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1. Easlick, K. A. Dental caries—mechanism and present control technics as evaluated at the University of Michigan Workshop. St. Louis, C. V. Mosby Co., 1948, p. 201.

2. National Academy of Sciences—National Research Council. Survey of the literature of dental caries. Publication 225. Washington, D. C., National Academy of Sciences, 1952, p. 52.

3. Rosebury, T.; MacDonald, J. B., and Clark, A. R. A bacteriologic survey of gingival scrapings from periodontal infections by direct examination, guinea pig inoculation, and anaerobic cultivation. J. D. Res. 29:718 Dec. 1950.

4. McClure, F. J., and Hewitt, W. L. Relation of penicillin to induced rat dental caries and oral L. acidophilus. J. D. Res. 25:441 Dec. 1946.

5. Webman, H.; Hill, T. J., and Kniesner, A. H. The effect of penicillin on dental caries in rats fed on a coarse corn diet. J. D. Res. 28:258 June 1949.

ever, there was a trend toward less caries. The authors stated:

> . . . under conditions simulating those of the human oral cavity, i.e. with a daily intake of sugar, there was a definite and constant reduction of frequency and rate of progress [of caries] with each increment of penicillin [added] to the water supply.

Studies on hamsters[6, 7] in which a dentifrice containing penicillin was used also have indicated a significant inhibition in these animals. It was noticed also that the reduction in both carious teeth and carious area was consistent when the hamster studies were repeated. These authors also came to the conclusion that penicillin might have value in combating human dental caries. In one of these studies,[7] two other antibiotics, chlortetracycline (Aureomycin) and tyrothricin, were compared as to their effectiveness in inhibiting caries in hamsters. Chlortetracycline inhibited dental caries but was not as effective as penicillin. Penicillin, bacitracin, streptomycin, chlortetracycline and chloramphenicol (Chloromycetin) were studied in order to determine their ability to prevent experimental caries in rats.[8] These authors used the following criteria for the evaluation of the reduction in caries brought about by the antibiotics tested: (1) the percentage of rats which developed caries; (2) the number of carious teeth, and (3) the extent of the carious lesions. They found that penicillin showed the greatest inhibitory effect, followed by bacitracin, chlortetracycline, chloramphenicol and streptomycin, in descending order of effectiveness. All of the rats given streptomycin developed caries, but the extent of the carious lesions was only about half that of the control animals.

By the use of the method of Fosdick and co-workers[9] for determining the absorption or attachment of substances to the dental plaque, it was found that penicillin, chlortetracycline, oxytetracycline, and subtilin were retained on the plaque for several hours.[10] A tooth powder containing penicillin was tested on 60 individuals to see if it would prevent the tooth surface from becoming more acid than pH 5.5. The maximum acidity obtained after sucrose rinse was pH 6—well above the isoelectric point of enamel. Penicillin was retained on the dental plaque for from 12 to 24 hours.[10]

These studies give powerful evidence that antibiotics which inhibit the gram-positive flora and which are retained by the dental plaque have a caries inhibiting effect. This evidence supports the inclusion of these antibiotics, especially penicillin, in a dentifrice in order to provide a "therapeutic dentifrice."

Clinical Studies • Four clinical studies of dental caries in children in which a penicillin dentifrice was used have been reported.[11-14] At first glance the results of these studies are contradictory. In the first study,[11] 1,000 units of penicillin was used per gram of dentifrice powder. This was an unregimented study and there was no demonstrable reduction in the incidence of dental caries. In the second study,[12] 500 units of potassium penicillin G was used per gram of tooth powder. This was a regimented study, also on children, and a significant decrease in

6. Zander, H. A., and Bibby, B. G. Penicillin and caries activity. J. D. Res. 26:365 Oct. 1947.

7. Zander, H. A.; Lisanti, V. F., and Shiere, F. R. The validity of hamster studies in caries control. J. D. Res. 30:139 Feb. 1951.

8. Stephan, R. M., and others. Comparative effects of penicillin, bacitracin, chloromycetin, aureomycin, and streptomycin on experimental dental caries and on certain oral bacteria in the rat. J. D. Res. 31:421 June 1952.

9. Fosdick, L. S.; Ludwick, W. E., and Schantz, C. W. The absorption of enzyme inhibitors and antibiotics in dental plaques. J.A.D.A. 43:26 July 1951.

10. Fosdick, L. S., and others. A new approach to the problem of dental caries control. J. D. Res. 32:486 Aug. 1953.

11. Hill, T. J., and Kniesner, A. H. Penicillin dentifrice and dental caries experience in children. J. D. Res. 28:263 June 1949.

12. Zander, H. A. Effect of a penicillin dentifrice on caries incidence in school children. J.A.D.A. 40:569 May 1950.

13. Walsh, J. P., and Smart, R. S. Clinical trial of a penicillin tooth powder. New Zealand D. J. 47:118 July 1951.

14. Hill, T. J.; Sims, J., and Newman, M. Effect of penicillin dentifrice on the control of dental caries. J. D. Res. 32:448 Aug. 1953.

caries was reported. The third study[13] reported no increased benefit from the inclusion of 100 units of penicillin per gram of dentifrice. In the fourth study[14] a dentifrice containing an average of 1,000 units of procaine penicillin per gram was used. This was a tooth paste while the dentifrices in the other studies were tooth powders. This was also a regimented study. There was a slight reduction in the amount of dental caries (15.93 per cent judged by DMF surfaces—14.52 per cent judged by the number of lesions occurring).

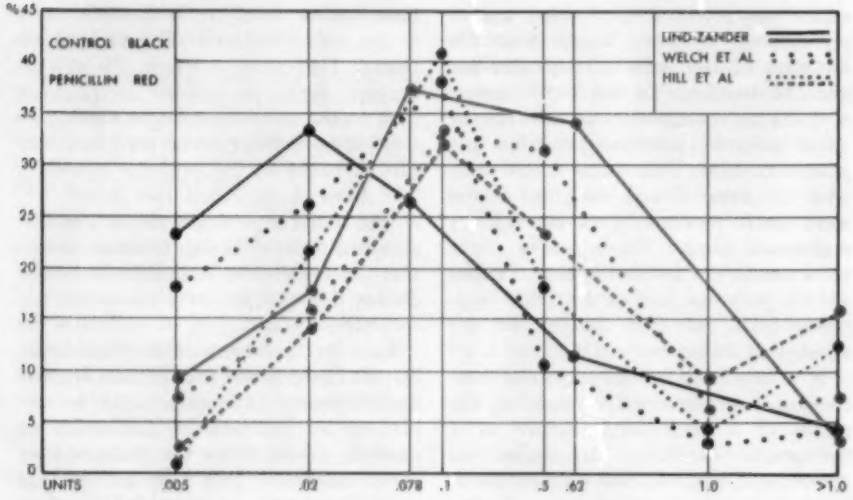
It is impossible to draw definite conclusions from these studies regarding the merits of a penicillin dentifrice as a therapeutic dentifrice. It should be pointed out, however, that unless a therapeutic agent is used according to the prescription of the physician or dentist, it cannot be expected to be effective. Therefore the first study[11] should not be considered when judging whether the inclusion of penicillin in a dentifrice makes it a therapeutic dentifrice. However, that study does bring out the fact that toothbrushing habits are not such that children can be counted on to cooperate by brushing their teeth without supervision as regularly as they would take a pill under supervision as a therapeutic agent for a specific disease. The third study used only 100 units per gram of calcium penicillin, against the 500 units per gram of potassium penicillin used in the second study. It is possible that the differences in the results of these studies may be due to differences in the type and amount of penicillin used in the dentifrices. Finally, in the fourth study, where much less reduction in dental caries was found than in the second study, procaine penicillin which is less soluble and which has a larger molecule was used. It would be necessary to investigate the plaque from the standpoint of both the penetrability and the adsorption of different penicillins in order to answer whether the observed differences between these studies were due to the differences in the penicillins used. The Council on Dental Therapeutics, whose job it is to evaluate dental therapeutic agents, finds itself in the same dilemma in coming to a definite conclusion about penicillin dentifrices, based on the available evidence. The Council published two reports[15, 16] on the status of penicillin dentifrices and classified them in Group C which means that the evidence is so limited or inconclusive that the products cannot be accurately evaluated.

Even if there were no differences in the material used in the four clinical studies, the difference in results might be explained by the lack of uniformity of methods available for the evaluation of caries incidence. It is well known that caries incidence varies considerably in different parts of the United States and of the world. It varies with different ages. An agreement among investigators on procedures to be used when studying therapeutic measures in the field of dental caries is long overdue. This is a most urgent job for an agency of the American Dental Association, such as the Council on Dental Research, to undertake. A survey[2] published in 1952 by the National Research Council of the National Academy of Sciences comes to the same conclusion, as expressed by A. L. Johnson:

> The need for a definite rule of procedure in determining the incidence of dental caries is obvious. Methods of technic reported vary from an examination with mouth mirror and explorer, taking five minutes or less, to one which involves cleaning, drying, and x-raying the teeth before recording an estimate of caries incidence. Naturally the comparison of data from such diverse methods is useless. Statistical treatment cannot erase the faults derived from such extreme differences in the methods of examination.

15. American Dental Association. Council on Dental Therapeutics. Council issues preliminary report on penicillin dentifrices. J.A.D.A. 40:619 May 1950.

16. American Dental Association. Council on Dental Therapeutics. Council reports on current status of penicillin dentifrices. J.A.D.A. 45:466 Oct. 1952.



Composite graph of penicillin sensitivity distribution of streptococci from the mouths of penicillin dentifrice users and nonusers. Abscissa: minimal inhibitory concentrations of penicillin in units per milliliter. Ordinate: percentage of streptococci isolated that were sensitive to the concentration shown on the abscissa

While this is indeed an indictment of the dental profession, the fact should not be overlooked that dental caries does not seem to fit into the pattern of such bacterial diseases as pneumonia and tuberculosis. Therefore studies on the effect of therapeutic measures must also take on a different pattern from that which is standard for similar investigations in medicine.

It is well known that antibiotics produce side reactions when therapeutic doses are administered for diseases other than dental caries. Does this also hold true for antibiotic dentifrices? An answer to this question as far as sensitivity reactions to penicillin dentifrices are concerned is as follows: Studies on children in Walpole[13] and on 4,480 other persons and studies by Hill[14] have shown that sensitivity reactions are not frequent and are not serious enough to cause concern. The fact that penicillin dentifrices have been on the market for three years without causing serious difficulties points to the same conclusion.

Will the use of a penicillin dentifrice result in the development of penicillin resistant microorganisms? Three studies[17-19] have concerned themselves with that question. The first study presented its data in table form, using streptococci as an example of the changes in penicillin resistance. The streptococci were broken down into four different groups, and concentrations from 0.0011 to 10 units of penicillin were used for measuring resistance. The other two studies used streptococci, too, not broken down into subgroups, starting with units of 0.005 to

17. Lind, H. E., and Zander, H. A. Penicillin resistance of streptococci and staphylococci in a penicillin dentifrice study. J. D. Res. 30:112 Feb. 1951.

18. Welch, H., and others. The effect of prolonged use of penicillin tooth powder on the penicillin resistance of oral microorganisms. Antibiotics & Chemother. 2:249 May 1952.

19. Hill, T. J.; Resch, C., and Wollpert, B. The development of organisms with penicillin resistance associated with the use of a penicillin dentifrice. J. D. Res. 32:453 Aug. 1953.

more than 1 unit of penicillin. One of them gave results in graph form, the other used a chart for its presentation. The graph presented here combines the results from all three studies. It can be seen that the curves representing sensitivity of streptococci in penicillin dentifrice users are further to the right than those in nonusers. In other words, in all three studies the distribution of penicillin sensitivity of streptococci shows that the groups using penicillin dentifrices had more organisms resistant to higher concentrations of penicillin. Yet in all three studies there were organisms in the control groups that were also resistant in the higher unit concentration. As a matter of fact, in Hill's study, a greater percentage of streptococci was found to be resistant to more than one unit of penicillin in the control group than were similarly compared organisms in the penicillin group in Welch's and in Lind and Zander's studies. In interpreting these data one would be justified in stating that the use of the penicillin dentifrice resulted in an increase in the number of penicillin-resistant streptococci in the mouths of people using the penicillin dentifrice over those in the control group.

However, there was also a considerable percentage of streptococci in the control group that were just as penicillin-resistant as the streptococci in the experimental group. The degree of resistance does not appear to be one in which treatment with penicillin would be impossible should these organisms become pathogenic. The chances for these mouth organisms to become pathogenic actually may be very slight. Under no circumstances can these data be interpreted that the mouth organisms build up a tolerance to penicillin as was stated recently by Fosdick.[10] I, for one, do not feel concerned about the changes produced in bacterial sensitivity if the use of a penicillin dentifrice would be an effective therapeutic agent for dental caries. Unfortunately, it cannot be stated in the affirmative that any dentifrice will ever be a therapeutic agent. The reason for this statement is based on the fact that people do not treat a dentifrice for daily use with the same respect that they would a therapeutic drug in the form of a solution or pill. The addition of a drug such as an antibiotic to a dentifrice does not alter this basic fact: dentifrices, *per se*, simply are not suitable for therapeutic agents. At present, penicillin dentifrices are sold only on a prescription basis and are recommended primarily for cases of rampant caries or for use under a strictly supervised regime. This means that penicillin dentifrices come as close to a therapeutic dentifrice as anything has ever come. In this case it is not a therapeutic measure for the reduction or cure of carious lesions that is being dealt with but it is a therapeutic measure for the prevention of the occurrence of dental caries.

PERIODONTAL DISEASE

Dental pastes, troches and chewing gum containing antibiotics are advertised to the dental profession for use in the treatment of periodontal disease. The step of using dentifrices as a vehicle for this use of antibiotics is only a small step. As yet there have not been any major clinical studies reported on the use of antibiotic dentifrices in the treatment of periodontal disease.

In many research laboratories the quest for antibiotics and an understanding of their action continues. Therefore, it stands to reason that more will be heard about antibiotics in the future and the possibilities of their action as a therapeutic agent for the prevention of dental disease.

EFFECT OF SINGLE BRUSHINGS WITH COMBINATIONS OF DIBASIC AMMONIUM PHOSPHATE AND UREA ON HUMAN SALIVARY LACTOBACILLUS COUNTS

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The possibility of reducing caries activity with ammonia was based originally on an interest in caries-resistant individuals. No one will deny that there is a varying resistance to caries. It is obvious that there is a natural resistance which seems to completely protect some fortunate individuals from ever experiencing this disease. A few such individuals were studied in order to determine what they might have in common that would serve as a clue to their resistance. The study revealed only that *Lactobacillus acidophilus* was missing from their oral flora. Subsequent investigation revealed that saliva collected from these individuals inhibited the growth of lactobacilli, and the potency of the inhibiting agent increased when the saliva was allowed to stagnate. Analyses of the stagnated saliva or of bacterial cultures of saliva revealed the presence of ammonia and also the fact that the amount of ammonia was directly related to the lactobacilli inhibiting power. Further study determined that when ammonia was combined with urea the bacterial destruction was enhanced and acid production from sugar by salivary and bacterial enzymes was checked. These observations led to the inclusion of these substances in dentifrices in the hope that their frequent application to the teeth might fortify or stimulate into action the natural mechanism that defends against caries—a mechanism that is noticeably suppressed in most individuals because of their high sugar consumption.

Preliminary studies on adults indicated that beneficial results were obtained by the conscientious use of a dentifrice and mouth rinse containing 5 per cent dibasic ammonium phosphate and 3 per cent urea. The results encouraged a large scale study on school children 10 to 12 years old, an age when there is high caries activity. Examinations made after two years of morning and afternoon brushing in the classroom five school days per week for the nine months of each of the two school years revealed approximately 20 per cent reduction in caries experience for the children who used the ammoniated dentifrice as compared to the experience of the children who did not brush in the classroom, and approximately 10 per cent reduction as compared to that of children who followed the same classroom brushing technic but who used a nonammoniated dentifrice. These results were not as striking as those obtained in the earlier studies with adults.

In retrospect, probably more was expected of the dentifrice than was possible under the conditions of the experiment. In the earlier studies the dentifrice was used more intensively than it was possible or practical for it to be used by the grade school pupils. No effort was made to control the diet in either the adult or the

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child study, but in the school study the high carbohydrate consumption was apparent. Every now and then a child would sit down at his desk, take a lozenge or hard candy out of his mouth, place it on the paper towel covering his desk while he brushed his teeth, and replace the sweet in his mouth as soon as the brushing operation was completed. It is recognized, however, that this is a typical condition with which any dentifrice must compete if it is to be used for caries control in the general population.

More recent work has been concerned with the effects of single supervised oral hygiene procedures on salivary lactobacilli counts. Reduction in human salivary lactobacillus counts after the prolonged application of oral hygiene procedures is generally, although not universally, accepted as an indication that the applied procedures will tend to reduce the incidence of dental caries in those individuals who follow them consistently.

The method usually followed to determine the effect on human salivary lactobacillus counts requires a minimum of seven weeks.[1] It obviously would be desirable to obtain an indication of clinical effects within a much shorter time.

The object of this investigation was to develop a rapid and significant intraoral screening method for dentifrices and other oral hygiene preparations. The method selected determines the effect of a supervised oral hygiene procedure, such as brushing, or brushing followed by a rinse, on the number of lactobacilli in the resting saliva of human subjects over a period of two hours and twenty minutes. The effect of single brushings on salivary bacterial counts has been observed by earlier investigators, most recently by Gerke and Spitzbart.[2-4]

The work of Gerke and Spitzbart was reported in a German journal which may not be readily available. After conducting some *in vitro* experiments, Gerke and Spitzbart compared the effects of five different supervised single oral hygiene procedures on the population of acidogenic bacteria in the resting saliva of human subjects. For that purpose, 100 individuals were divided into five groups of 20 each. They reported for the test about nine o'clock in the morning, after having eaten breakfast, but before brushing their teeth. Samples consisting of a loopful of resting saliva were taken, the oral hygiene procedure was followed and another loopful of saliva was taken immediately and at 5, 25 and 90 minutes after brushing was completed. The first group brushed and rinsed with water, the second and third brushed with two different commercial ammoniated tooth powders and rinsed with a water, the fourth group brushed with a tooth paste containing "Para-oxyl-Cymol in anorganischer Bindung" and rinsed with water, and the fifth group brushed with a tooth paste containing a derivative of an ester of p-hydroxybenzoic acid and rinsed with water.

In all five groups, the number of acidogenic bacteria in the samples of resting saliva was lower after the oral hygiene procedure than before. The two ammoniated tooth powders and the paste containing a p-hydroxybenzoate ester derivative were the most effective.

PROCEDURE

The subjects in the study to be described used various oral hygiene procedures under supervision on different days. On those days when a subject was not to

1. Ludwick, W. E.; Fosdick, L. S., and Schantz, C. W. Effect of dentifrices on lactobacillus counts: antibiotics and enzyme inhibitors. J.A.D.A. 43:285 Sept. 1951.

2. Florestano, H. J.; Elliott, M. A., and Faber, J. E., Jr. Effect of citrus juices and various mouth prophylaxes on the oral flora and saliva. J. Bact. 41:605 May 1941.

3. Gerke, J., and Spitzbart, A. Die Beeinflussung der Säurebildner der Mundhöhle durch neuartige Zahn-und Mundpflegenmittel. Zahnärztliche Rundschau 60:471 Dec. 1951.

4. Appleton, J. L. T. Bacterial infection with special reference to dental practice, ed. 4. Philadelphia, Lea & Febiger, 1950, p. 622-624.

Table 1 • Oral hygiene aids tested

Dentifrice	No. of subjects	pH of dentifrice*
Water (brush and rinse)†	23	6.6
Control powder	42	8.2
5% DAP‡ and 22% urea	30	7.9
5% DAP and 3% urea	37	7.8
3% DAP and 2% urea	24	8.3
5.4% DSP§ and 3% urea	9	9.2

*The powder was dispersed in 2 parts of water for pH measurement.
†No rinse was used with the dentifrices.
‡Dibasic ammonium phosphate.
§Dibasic sodium phosphate.

report for a test he followed his usual plan of mouth care. Since the control and test procedures were followed by the same individuals, each subject was his own control. As the method of collecting saliva and the medium used for counting bacteria in this study differ considerably from those employed by Gerke and Spitzbart, the results of this study cannot be compared directly with those of Gerke and Spitzbart.

The subjects were 42 students who ranged in age from 18 to 41 years. Approximately one-fourth were women. All met the following qualifications: (1) Specimens of their paraffin-stimulated saliva collected before breakfast on two successive days contained more than 50,000 lactobacilli per cubic centimeter when counted by the Hadley method.[5] A single count was made on each sample of saliva in all instances. Isotonic sodium chloride solution or distilled water was used instead of acid glucose broth as diluent for the saliva. (2) Their unstimulated saliva had a sufficiently low viscosity to permit its measurement with a conventional pipette. (3) Their unstimulated saliva collected after breakfast but before brushing their teeth contained 5,000 or more lactobacilli per cubic centimeter. It is preferable to exclude subjects if the counts are below 30,000 under these conditions.

Forty-two of the subjects who met the three basic requirements used the control

Table 2 • Lactobacillus counts in thousands on resting saliva before and at intervals after brushing with control tooth powder

Subject	Before brushing "B"	After brushing 10 min.	After brushing 45 min.	After brushing 140 min.
Ba	18	55	32	24.5
Bl	45	72.5	98	70
Bn	50	100	65	55
Br	92	126	62.5	123.5
By	60	95	75	65
Cs	47	87	57	46
Ds	400	445	365	505
Fn	51	68.5	5	0
Fr. E.	160	160	175	170
Fr. F.	205	85	55	35
Ft	30	29	17	20.7
Gl	65	70.5	65	60
Gn	15	40	12	16
Hk	52	50	45	47
Iu	40	55	70	55
Js	49	70	81	60
Ky	*	279	254	238
Le	33	52.5	39	28.5
Lh	50	110	35	50
McD	100	170	135	105
Mr	80	130	60	70
Ms	12	23	8	14
No	37	70	50	45
Ok	26	17	13	4
Pi	42.5	65	48.5	32.5
Pr	30	54	40	45
Ps	124	81	140	115
Rc	23	47	55	48
Rd	30	25	30	35
Ri	87	60	90	140
Rn	80	120	100	112.5
Rs	42	75	33	53
Se	145	170	94	125
Sk	57	80	62	57
Sw	23	26	25	30
Sy	148	230	160	145
Te	45	34	51	51
Ti	148	52	31.5	48
Tf	42	32	35	45
Uh	35	40	23.5	35.5
Wn	5	4	5	6.5
Ws	13	22	29	16.5

*Too numerous to count.

powder. Those who had been tested satisfactorily with the control powder and who were available when it was decided to test a dentifrice containing added ingredients were utilized in such tests. While not all of the eligible subjects used all of the dentifrices, those selected to

5. Hadley, F. P. Quantitative method for estimating Bacillus acidophilus in saliva. J. D. Res. 13:415 Oct. 1933.

Table 3 • Lactobacillus counts in thousands on resting saliva before and at intervals after brushing with the tooth powder containing 3% DAP and 2% urea

Subject	Before brushing "B"	After brushing 10 min.	After brushing 45 min.	After brushing 140 min.
Ba	240	255	75	27
Bi	186	155	62	122
Bn	142.5	225	41	210
Br	94	186	33	31.5
Fn	75	37.5	25	3
Fr. E.	516	618	189	141
Fr. F.	61	153.5	43	14
Gl	75	85	15	0.1
Gn	64	31	5	2
Hk	45	51	34	6.5
Le	43.5	38	11.5	3.2
Lh	110	145	33	9.1
McD	102.5	137.5	66	8
Mr	60	190	27.5	15
Ms	47.5	40	20	8
Ok	35	17.5	8	2
Pi	53	80	16	4.3
Ps	100	235	32.5	2
Rc	21	15.5	5	1
Ri	200	140	45	7.5
Rn	100	170	32.5	4
Sk	60	45	12.5	2
Sy	80	55	25	30
Te	112.5	150	29	15

use any given test dentifrice were chosen from the group of 42 solely on the basis of their availability at the time. The data reported for a given test dentifrice include the results on all individuals who used that dentifrice.

Each subject was instructed individually in the procedure he was to follow. He was told to eat his usual breakfast on each test day, but not to brush his teeth before coming to school. He was allowed to rinse his mouth with tap water before eating breakfast if he wished. The subjects arrived at the laboratory 30 to 60 minutes after finishing breakfast.

Five sterile jars, labeled with the name of the subject and the designations, "B," "10," "45," "90" and "140" were ready for his use in collecting saliva samples when he arrived at the laboratory. Written instructions concerning the oral hygiene procedure he was to follow on that morning were with his jars.

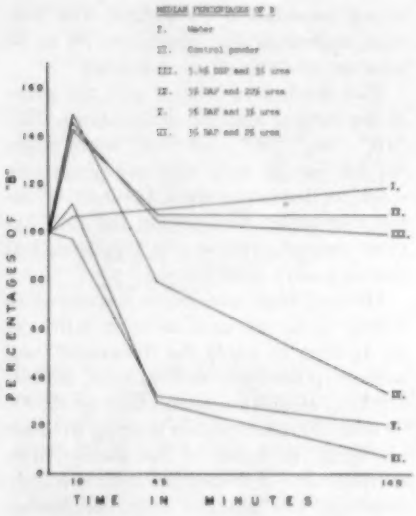
He had been previously instructed to collect 3 cc. of unstimulated saliva in jar B, then to apply the designated oral hygiene procedure, and to start collecting 3 cc. of unstimulated saliva at 10, 45, 90 and 140 minutes after starting to brush his teeth. In some of the earlier runs, samples were collected immediately after brushing, five minutes after completion of the collection of the after-brushing sample, 30 minutes after completing the collection of the five-minute sample, and 90 minutes after collecting the 30 minute sample. This system of timing provided samples started at approximately two, 10, 45 and 140 minutes after starting to brush. Only the "B," 10, 45, and 140 minute counts and their approximate counterparts obtained by the original system of timing are reported in this paper.

Each subject was shown how much dentifrice constituted a gram, and was instructed to moisten his brush only once and to utilize a gram of dentifrice, brushing for one minute in such a manner as to reach all accessible tooth surfaces, and

Table 4 • Ranges, median values and mean values for the oral hygiene aids tested

Dentifrice	Percentages of "B" after brushing											
	10 minutes				45 minutes				140 minutes			
	Low	High	Median	Mean	Low	High	Median	Mean	Low	High	Median	Mean
Water, brush and rinse	58	283	107	126	65	267	110	126	50	220	119	127
Control powder*	35	306	143	141	21	239	108	111	15	209	108	110
5.4% DSP and 3% urea	94	209	146	153	69	162	105	109	44	130	100	95
5% DAP and 22% urea	62	575	149	173	10	955	80	119	2	550	34	82
5% DAP and 3% urea	4	258	98	96	1	167	33	34	0	92	21	29
3% DAP and 2% urea	48	317	113	126	8	76	31	34	0	147	8	20

*Values for Ky (see Table 2) were not included in this data.



Graphic portrayal of medians from Table 4

to spit out the excess dentifrice. The subjects were allowed to choose their own technics of brushing.

The ten minute saliva sample was left in the laboratory, and the jars for the 45, 90 and 140 minute samples were taken out of the laboratory by the subject who was instructed to collect 3 cc. of saliva in each of them at the stated times and to return them to the laboratory when the last sample was collected.

MATERIALS

The tooth brushes were a commercially available type bristled with three rows of medium nylon filament; six tufts of equal length in each of the two outer rows and six shorter tufts in the center row. The dentifrices were prepared in the manufacturing pharmacy of the University of Illinois.

The formula for the control dentifrice was as follows: calcium carbonate, precipitated, 926 parts, measured by weight; tricalcium phosphate, 50 parts; soluble saccharin, 2 parts; menthol, 2 parts; peppermint oil, 2 parts; cinnamon oil, 2 parts; methyl salicylate, 6 parts; sodium lauryl sulfate, 10 parts. Where ingredients were added to the dentifrice in order to determine their effect on lactobacillus counts, the amount of calcium carbonate was reduced proportionately. The proportions of the other inert ingredients were held constant. The oral hygiene aids are listed in Table 1.

ANALYSIS OF DATA

Counts of lactobacilli in the resting saliva for the control powder series are shown in Table 2. Similar data for the series with tooth powder containing 3 per cent dibasic ammonium phosphate (DAP) and 2 per cent of urea are shown in Table 3. The data in Tables 2 and 3 are included simply to indicate the magnitudes and variations in the actual counts. Each subject used each dentifrice only once.

In order to obtain a uniform basis for comparison of data from different subjects on different days, the number of lactobacilli per cubic centimeter of resting saliva just prior to brushing the teeth was taken as 100 per cent, in each instance. This is the "before" or "B" count in Tables 2 and 3.

The lactobacillus count data for each subject after a given test procedure were then expressed in percentages of "B." Thus, the percentages corresponding to the lactobacillus counts listed for subject Bi in Table 2 at 10, 45 and 140 minutes would be 161, 208 and 155.

Table 5 • Median percentage values for controls for various test series

Series	Median % of "B"		
	10 min.	45 min.	140 min.
All 42 controls*	141	107	108
Control for water (brush and rinse)	106	100	107
Control for 5.4% DSP and 3% urea	140	108	98
Control for 5% DAP and 22% urea	114	102	108
Control for 5% DAP and 3% urea	138	106	107
Control for 3% DAP and 2% urea	154	108	103

*Subject Ky (see Table 2) is included in this data.

Table 6 • Ranges and median percentages of "B" for subjects with higher-than-median and lower-than-median "before" counts

Series	High "B" Counts				Low "B" Counts				Composite			
		Median percentages				Median percentages			Median percentages			
	Range*	10 min.	45 min.	140 min.	Range*	10 min.	45 min.	140 min.	10 min.	45 min.	140 min.
41 Controls†	400-47	140	106	101	47-5	159	113	117	143	108	108
5% DAP and 22% urea	715-49.5	121	65	25	49-14	191	107	39	149	80	34
5% DAP and 3% urea	230-50	123	39	27	50-15	51	15	13	98	33	21
3% DAP and 2% urea	516-80	126	32	12	75-21	85	28	6	113	31	8

*Of actual counts before brushing (in thousands).
†Ky was omitted.

The data in Table 4 are based on percentages calculated as described in the foregoing paragraph and the curves in the illustration are the graphic portrayal of the medians from Table 4.

In order to determine whether the control counts for each of the experimental series were comparable, the control counts for each series were tabulated separately and percentages of "B" for each group of control counts were calculated. The median percentage values for the controls for each series and for the complete control group of 42 subjects are listed in Table 5. They are all similar.

It seemed possible that the trend of after-brushing counts might depend to some extent on the magnitude of the "before" count. Therefore, the data for the control powder series and for three of the experimental dentifrice series were split into those with higher than median "before" values and those with lower than median "before" values and separate medians were tabulated for each half of each series. The differences do not show a consistent trend. The medians and ranges are shown in Table 6.

CONCLUSIONS

These results indicate that single brushings with tooth powders containing various proportions of diammonium phosphate and urea are followed by a decrease in the number of lactobacilli in the resting saliva, a decrease which lasts at least 140 minutes, while single brushings with tap water followed with a tap water rinse are followed by an increase in lactobacilli counts (see illustration and Table 4); and single brushings with a control powder containing no ammonia or urea are followed by a transient increase and subsequent decrease in lactobacilli to approximately the initial value.

It may be stated that (1) there is a natural mechanism that resists caries activity; (2) ammonia and urea are factors in that natural process and can be used to assist it; (3) they provide a supportive or supplementary action to other effective procedures such as dietary control; (4) it can be demonstrated *in vitro* and *in vivo* that they have an inhibiting effect on lactobacilli; (5) they are nontoxic natural constituents of the oral environment; (6) the work being conducted and other work which is contemplated are designed to bring out more fully the value of these agents in relation to other potentially caries-inhibiting substances and dentifrices. The public is becoming more dental and more hygiene conscious and this should be reflected in an improvement in dental health.

PRESENT STATUS OF CHLOROPHYLL DERIVATIVES AS DENTAL THERAPEUTIC AGENTS

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The term "therapeutic dentifrice" implies a broader action than prevention of dental caries. Periodontal disease, oral calculus, halitosis and discoloration of the teeth are also important targets for the ideal therapeutic tooth paste. Any systemically harmless agent added to a dentifrice should be thoroughly investigated for beneficial or detrimental effects on all parts of the oral cavity. This has not been the case with many tooth pastes advocated to date. Eventually many of the claims for chlorophyllin products may be proved valueless, but the "chlorophyll era" has done dentistry one service, it has broadened the focus of clinical research from decay in teeth to a consideration of the entire oral cavity.

Because the direct or implied claims for chlorophyllin products cover beneficial effects against dental caries, gingival disease and halitosis, thus apparently making chlorophyll derivatives the closest approach to an ideal therapeutic dentifrice ingredient yet advocated, it is essential that the dental profession be well acquainted with the evidence behind those claims.

GENERAL CONSIDERATIONS

Before 1951 the commercial production of industrial quantities of water-soluble chlorophyll derivatives was a relatively small business. The main demand for the compounds was for use as a dye stuff to color food and soap products green. To be sure, research on other applications of the materials had been in progress for many years but this research was on a small scale. Because of economic restrictions, and also perhaps because of a lack of appreciation of the value of research, there was a lack of incentive on the part of the chlorophyll industry to devote sufficient time and effort to produce a uniform product or to attempt to produce highly purified materials for research purposes. This situation led to unfortunate consequences when, practically overnight, the manufacturing of chlorophyllins and chlorophyllin products mushroomed into a multimillion dollar business in 1951. In the wild scramble to produce green products, which has had few if any parallels in the history of private enterprise, the emphasis with few exceptions was on the greenness and not on the purity or uniformity of the chlorophyll derivatives produced. Fortunately the situation has improved considerably during the past two years mainly because of the insistance and support of research by one chewing gum company more intent on a sound business reputation than a quick ephemeral profit.

This background has been dealt with at some length because it has a real bearing on an attempt to evaluate the claims for the chlorophyll derivatives. Never has a substance been so exploited and prostituted by ridiculous applications and it is only natural that everyone's judgment will have been highly influenced by subjective reactions.

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VARIABILITY OF SAMPLES OF WATER-SOLUBLE CHLOROPHYLL DERIVATIVES

The production of industrial quantities of chlorophyll derivatives is a difficult process. In the methods employed at present the resulting product is probably a mixture of degradation compounds. Eventually, chemically pure derivatives must be isolated and tested. Given a mixture of chlorophyll derivatives it should be possible for various workers to determine if this mixture has the ability to deodorize, affect dental caries, or benefit gingival disease. This will be true, however, only if the mixtures are uniform. While progress has been made in this direction, much of the research to date has been conducted with samples different from each other in chemical, physical and biological properties.

For example, work of mine[1] on copper chlorophyllin samples, the metallic derivatives most frequently employed, collected from 1947 to 1952 showed that they differed widely in copper content and, surprisingly enough, that in the majority of cases the copper present was only about 50 per cent of the theoretical amount to be expected. It was further found that the characteristics of the absorption spectra and neutralizing power of the derivatives also differed in an irregular manner. Also, no uniform relationship was found to exist between the so-called purity rating of the compounds and their ability to inhibit salivary acid production in the test tube. In addition, further work showed that when certain of the samples were treated with acid they released varying amounts of copper ions. Finally, it was found that samples varied in their ability to deodorize, some having no capacity in this respect.

In view of these findings it is not surprising that conflicting research reports have appeared in the literature. Since it is perfectly possible to conduct odor tests with a chlorophyllin sample that has no deodorizing power, it is conceivable that the same conditions may apply to studies on dental caries or gingival disease. This means, of course, that any positive findings will be worthless until some manufacturing control can be exercised which will yield compounds consistently giving the desired results.

The ability to deodorize can be checked quickly by simple laboratory tests and this has led to specifications which, if insisted on, will yield an effective product. With this beginning the identification of the fraction of the chlorophyllin samples having this effect and its mechanism of action should be discovered soon. There are no such simple tests to determine possibilities of caries prevention or gingival disease prevention, however, and for this reason considerable time will elapse before these possible actions of chlorophyll derivatives are proved.

CHLOROPHYLL DERIVATIVES AS CARIES PREVENTIVE AGENTS

The only conclusive test of a caries-preventive agent is by an adequately controlled clinical trial. It might be added that if a caries-preventive tooth paste is to be of real value in the hands of the public it should be proved effective given the conditions under which it will generally be employed by the public. Effectiveness only under unrealistically rigorous conditions of use will doom any product to limited usefulness. To date there is no published evidence of a clinical trial of chlorophyllin tooth pastes against dental decay. Therefore, it must be concluded that any inference that these agents are effective against human tooth decay is purely speculation.

Dental research workers employ a number of means in an attempt to predict the effectiveness of caries-preventive

1. Hein, J. W. Experimental studies of oral health—evaluation of certain water-soluble chlorophyll derivatives. Thesis, University of Rochester, 1952.

agents. These are based on bacteriostatic and bactericidal effect on oral bacteria, inhibition of acid production from carbohydrate by salivary bacteria, inhibition of acid formation in the plaques on teeth, depression of solubility of powdered enamel in acids, changes in the lactobacillus and streptococcal counts of subjects and depression of dental caries rate in rats and hamsters. None of the means has been shown to provide accurate indication of the clinical effectiveness of caries-preventive agents. Their main value at the present time is to suggest the possible mechanism of action of compounds already proved to be caries-preventive agents, such as fluorides and penicillin, or thought to be, such as chlorophyll derivatives.

The more tests a compound satisfactorily passes, the more encouraged the research worker becomes, but never can he say that the tests in themselves prove that the substance is clinically effective. This is, of course, a point on which the research worker and the advertising man usually fail to see eye to eye.

The laboratory research behind the chlorophyll derivatives has, in general, given encouraging results. A number of workers including Gurney and Rapp,[2] Shafer and Hein,[3] McBride[4] and Nevin and Bibby[5] have reported that various chlorophyll derivatives had a bacteriostatic effect in the test tube against certain oral bacteria and decreased acid production in saliva carbohydrate mixtures. This was true not only for copper derivatives but also iron and magnesium varieties.

Tests of the ability of chlorophyll derivatives to decrease the lactobacillus counts of human subjects have produced conflicting results. Rapp[6] reported a significant decrease of lactobacilli in subjects using a chlorophyllin dentifrice over a 24 week period. Costich and Hein,[7] and the author,[1] employing four different chlorophyllins in a mouthwash, dentifrice and chewing gums, found no change in the lactobacillus counts of 119 subjects over a 20 week period.

Experimental animal studies have also produced conflicting results. Shaw[8] has reported that sodium copper chlorophyllin was ineffective against experimental dental caries in the albino and cotton rat. In the hamster, however, the results have been positive. In a series of reports Hein and Shafer [3,9-13] showed that copper chlorophyllin significantly decreased dental caries in the hamster. Their work indicated that it was for some reason more effective against dental decay in the female animals than in the males. Glass[12] found that brushing the teeth of hamsters with several different copper chlorophyllin dentifrices gave significant reductions in comparison with those obtained when control pastes were used. More recently Hein[13] reported that a magnesium chlorophyllin appeared to increase dental caries in male hamsters.

2. Gurney, B. F., and Rapp, G. W. Effect of water soluble chlorophyll "A" on certain enzymatic activities of human saliva. Presented before the International Association of Dental Research, June 24, 1949, Chicago.

3. Shafer, W. G., and Hein, J. W. Effect of sodium copper chlorophyllin on experimental caries and on in vitro acid production in incubated saliva-carbohydrate mixtures. Presented before the International Association of Dental Research, June 24, 1949, Chicago.

4. McBride, W. D. Preliminary report on the mechanism of action of porphyrin compounds on lactobacilli. (Abst.) J. D. Res. 31:486 Aug. 1952.

5. Bibby, Basil G., and Nevin, T. A. Effect of water-soluble chlorophyll on pure cultures of organisms commonly found in the oral cavity. (Abst.) J. D. Res. 30:469 Aug. 1951.

6. Rapp, G. W. Effect of water-soluble chlorophyll "A" on Lactobacillus acidophilus counts of saliva. Presented before the International Association of Dental Research, June 24, 1949, Chicago.

7. Costich, E. R., and Hein, J. W. Clinical study of the effects of a tooth paste containing sodium copper chlorophyllin on oral bacteria and gingival disease. (Abst.) J. D. Res. 31:474 Aug. 1952.

8. Shaw, J. H. Ineffectiveness of sodium copper chlorophyllin in prevention of experimental dental caries. New York D. J. 16:503 Nov. 1950.

9. Hein, J. W., and Shafer, W. G. Chlorophyll as a potential caries preventive agent. Pennsylvania D. J. 16:221 June 1949.

10. Shafer, W. G., and Hein, J. W. Further studies on the effect of chlorophyll in experimental dental caries. (Abst.) J. D. Res. 29:666 Oct. 1950.

11. Hein, J. W., and Shafer, W. G. Further studies on the inhibition of experimental caries by sodium copper chlorophyllin. (Abst.) J. D. Res.. 30:510 Aug. 1951.

12. Glass, R. Personal communication, December, 1952.

13. Hein, J. W. Effect of copper sulfate on initiation and progression of dental caries in the Syrian hamster. (Abst.) J. D. Res. 32:654 Oct. 1953.

The latter finding indicates that the metallic portion of the chlorophyllins apparently plays an important role in their activity, at least insofar as hamster caries is concerned. Experiments[12] with low levels of copper as copper sulfate have shown it to be highly effective against dental caries in the hamster. It may well be that the small amounts of free copper ions released from certain copper chlorophyllin samples, mentioned earlier in this paper, accounts for their caries-preventive action. Only further research along these lines will definitely answer this question.

It is evident, however, that the use of chlorophyll derivatives as caries-preventive agents is still very much in the laboratory stage.

CHLOROPHYLL DERIVATIVES AS GINGIVAL DISEASE PREVENTIVE AGENTS

The carrying out of an acceptable clinical test of a caries-preventive agent has long been recognized as one of the most difficult tasks of the dental research worker. With the advent of possible periodontal disease preventive agents, another equally or perhaps even more difficult task confronts dental investigators. Caries tests are concerned with tangible and recognizable lesions, which in some cases can be objectively recorded for evidence roentgenographically. The worker conducting a clinical trial concerned with gingival disease, on the other hand, is faced with the task of numerically rating conditions which still have not been classified to everyone's satisfaction. He has no established methods to follow. He is not only concerned with the presence or absence of lesions but also with the partial improvement of lesions. To further complicate the task, the soft tissues are constantly changing under the influence of both local and systemic factors. In other words, there is no baseline and one must depend entirely on comparison between control and experimental groups at each examination period. Finally, if it is believed that the agent will prevent rather than cure gingival disease, the study is complicated by the addition of groups receiving a complete oral prophylaxis.

Because of these many variables, comparisons between clinical trials of the effect of chlorophyll derivatives on gingival disease are difficult to evaluate. Four reports of extensive clinical trials are available to date. The first report is a lay article by Bailey[14] which reports that the work of Rapp at Loyola University showed the use of a chlorophyllin dentifrice to be highly effective against periodontal disease if preceded by a prophylaxis. In this study the case report method was employed and the progress of each patient was evaluated. This method has the disadvantage of a lack of rigorous control and a lack of objective data which can be statistically analyzed.

The second report was by Costich and Hein[7] who found that the use of a 0.1 per cent copper chlorophyllin tooth paste by 19 to 22 year old women for five months failed to improve the gingival condition as measured by estimation of hyperemia, edema, proliferation or bleeding in the buccal and labial gingivae of both jaws. Two groups were employed—53 subjects using a control tooth paste, 61 subjects using the same paste to which chlorophyllin had been added. Monthly examinations were conducted for seven months, the initial examination and the examination conducted at the end of the first month serving as controls.

The third report is by McDonnell and Domalakes[15] who found that the use of either of two different dentifrices containing 0.1 per cent copper chlorophyllin

14. Bailey, H. How to keep from getting false teeth. Better Homes and Gardens, Nov. 1951, p. 32.

15. McDonnell, C. H., and Domalakes, E. F. Effects of toothbrushing with dentifrices containing chlorophyllin on gingivitis. J. Periodont. 23:219 Oct. 1952.

gave a statistically significant improvement in the gingival health of young boys in 60 days when compared to a white control tooth paste. At the end of nine months there were no significant differences between the groups. Large groups of children were employed, and the PMA method of assessing gingival disease in the upper anterior gingivae was employed. The authors of this report point out that, because of the abnormally high incidence of gingival disease in the boys before the initiation of the experiment, and because of the use of a young age group, it would be incorrect to use their findings to predict the effect in other age groups or in subjects less severely affected. It should be mentioned also that because the control tooth paste was not colored, it probably lacked the unique attraction of the green chlorophyllin tooth pastes which few of the subjects had ever seen before. Confinement of the observations to the upper anterior gingivae is also to be regretted since there is no reason to suppose that all areas of the mouth will respond similarly to the use of a therapeutic dentifrice.

The fourth report[1] conducted along the same lines as that by Costich and Hein[7] but using chlorophyllin chewing gums and a mouthwash failed to show any beneficial effect on the gingival conditions of young adults 21 to 28 years of age. One hundred and seventy-seven subjects were employed and the experimental period covered three months.

More recently I[16] completed a study on 160 young adults 19 to 26 years of age, half of whom used a dentifrice containing 0.1 per cent copper chlorophyllin, the other half employed a control tooth paste colored green. Half of each group was given an oral prophylaxis after the control examinations. Two gingival examinations were carried out during the experimental period, one two weeks after the oral prophylaxis, the other at the end of three months. Detailed examination of the buccal and labial and lingual gingivae and a PMA assessment of the maxillary gingivae failed to show any improvement which could be ascribed to the use of the chlorophyllin.

Thus in two out of five different clinical trials the chlorophyll derivatives were felt to be of benefit against gingival disease and of no benefit in three. This evidence indicates that further research is necessary before chlorophyllin dentifrices can be accepted as of value in the treatment or prevention of gingival disease.

CHLOROPHYLL DERIVATIVES AS ORAL DEODORIZING AGENTS

A number of reports of *in vitro* and *in vivo* experiments[1,17,18] have indicated that certain samples of the chlorophyllins possess limited deodorizing power. It is not surprising that there have been some negative reports since, as has already been pointed out, samples vary in their ability to deodorize, and occasionally samples have been produced which entirely lack this property. The amount of deodorizing effect obtained with any given sample of chlorophyllin depends on the concentration of both the chlorophyllin and the odor agent. Contact between the two substances is necessary and, in general, the sulfur-containing odoriferous agents are the most effectively combated by the chlorophyllin samples. In view of these findings, many products containing only token quantities of the chlorophyll derivatives are valueless. In addition, since salivary flow rapidly decreases the concentration of agents in the oral cavity, claims which suggest that chlorophyll derivatives give a protective deodorizing effect in the oral cavity of

16. Hein, J. W. Unpublished data.

17. Westcott, F. H. Oral chlorophyll fractions for body and breath deodorization. New York State J. Med. 50:698 March 15, 1950.

18. Harrison, J. W. E., and others. A practical evaluation of "chlorophyll" in controlling breath odors. J. Soc. Cosmetic Chem. 4:9 March 1953.

several hours duration should be viewed with suspicion. On the other hand, it has been my experience that proper concentrations of effective samples of chlorophyll derivatives will have a demonstrable deodorizing effect against many odoriferous agents present in the oral cavity at the time the chlorophyllin sample is placed in the mouth.

SUMMARY

The evidence available to date regarding the use of chlorophyll derivatives as oral deodorizing agents, caries-preventive agents and gingival disease preventive agents has been reviewed. The existence of chemical, physical, and biological variations between various chlorophyllin samples may be a possible explanation for the conflicting results obtained by different investigators. Until the basis for these differences can be fully explained, it is felt that the use of chlorophyllin products for the prevention or cure of periodontal disease or dental caries cannot be recommended. At the present time the only claim that appears justified is that under certain conditions samples of the water-soluble derivatives of chlorophyll possess deodorizing power.

ENZYME INHIBITORY AGENTS

L. S. Fosdick, Ph.D., Chicago

During the past ten years the American public has been led to believe that by brushing the teeth with various types of preparations dental caries could be prevented. Unfortunately, the expectations aroused by clever advertising have not been fulfilled. Theoretically, it might be expected that brushing the teeth with a good cosmetic dentifrice, as is done by a good proportion of the American public, would have some benefit. Actually, from laboratory experiments there is some evidence to indicate that people who brush their teeth regularly should not have as many carious lesions as they would have had if they had not practiced this oral hygiene procedure.

When teeth are brushed morning and night with a cosmetic dentifrice, the drop in pH after a sugar rinse is not as marked as when the oral hygiene practice is omitted. Even though the teeth are brushed morning and night and the drop in pH is elevated, the acid potential still is frequently above the danger level.[1]

The theory of the etiology of dental caries which has the greatest amount of laboratory and theoretical support involves the rapid formation of acid by the enzymic degradation of fermentable carbohydrate that clings to the tooth surface after the ingestion of sweet foods.[2] If this well-substantiated theory is accepted, it is obvious that brushing the teeth on arising in the morning and again in the evening before going to bed should have little effect on the process. If it is true that the cause of decalcification is the acid formed by the enzymic degradation

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Professor of chemistry, Northwestern University Dental School.

1. Unpublished work performed in laboratory of Northwestern University Dental School.

2. Eastlick, K. A. Dental caries. St. Louis, C. V. Mosby Co., 1948.

of sugars,[2,3] then in order to prevent dental caries there should be a substance on the tooth surface or in the immediate vicinity of the tooth which would block the formation of acid. These substances in general may be termed enzyme inhibitors.

The acids may be blocked by the inhibition of any of the primary enzymes concerned in the initial stages of the anaerobic phase of carbohydrate degradation; or they also may be blocked by the inhibition of enzymes concerned in the metabolic process of the microorganisms associated with the degradation of carbohydrates to lactic acid. If the former is blocked it would not be expected that the organisms would develop a tolerance, while in the latter case a tolerance is probable. Thus, penicillin,[4,5] which presumably blocks the formation of nucleoproteins in the microorganisms, should prevent the formation of acid in the mouth, provided the penicillin is present in, on or near the tooth surface at the time sugars are ingested. However, tolerance is also developed with continued use. Ammonia blocks the formation of acid by inhibiting the growth of lactobacilli in a concentration of 5 mg. per hundred cubic centimeters, or it neutralizes the acid once it is formed from other organisms. It is obvious that if ammonia could be maintained in this concentration on the tooth surface during the time of ingestion of sugars, then no acids could form on the tooth surface from ingested sugars. Chlorophyll, which has been used in a dentifrice and about which many claims have been made, also will prevent the formation of acid if it is present in a concentration of 500 mg. per hundred cubic centimeters on the tooth surface. Obviously, a concentration of this magnitude on the tooth surface would make the teeth green, but if it were present in this concentration, it would block the formation of acids from carbohydrate.

In view of the ineffectiveness of the two latter compounds in the prevention of dental caries as determined by many investigators, it is clear that merely the ability to block acid formation is not enough to warrant therapeutic claims for a dentifrice. In order to be effective, an enzyme inhibitor must be present at the site of action at the time the sugar is present. It would be of little use to have a compound that effectively prevents the formation of acid from carbohydrate if it is not present when the carbohydrate is ingested. Under these circumstances, some method of providing a continuous supply of the inhibitor on the tooth surface must be made available.

It was found that penicillin, when introduced into the mouth by means of a dentifrice or a mouthwash, would block acid formation effectively on the tooth surface for from 12 to 24 hours, depending primarily on the individual. Further investigations indicated that the reason for this is that penicillin attaches itself to the dental plaque and remains active for from 12 to 24 hours.[6] Inasmuch as the active compound must become attached to the protein plaque in order to remain on the tooth surface, it may be fortunate that brushing the teeth cannot cleanse these caries-susceptible areas. Those surfaces where carious lesions are likely to occur are those areas inaccessible to a toothbrush; hence the thin layer of protein which may consist of denatured protein from salivary mucin, dead organisms and living microorganisms remains in place even after the most careful toothbrushing. Thus it is possible, when penicillin is used as a dentifrice,

3. Fosdick, L. S., and Hansen, H. L. Theoretical considerations of carbohydrate degradation in relation to dental caries. J.A.D.A. 23:401 March 1936.

4. Gale, E. F., and Rodwell, A. W. Assimilation of amino acids by bacteria. 7. The nature of resistance to penicillin in Staphylococcus aureus. J. Gen. Microbiology 3:127 Feb. 1949.

5. Gros, F., and Macheboeuf, M. Considérations biochimiques sur le mode d'action de la pénicilline. Ann. Inst. Pasteur 77:127 Aug. 1949.

6. Fosdick, L. S.; Ludwick, W. E., and Schantz, C. W. Absorption of enzyme inhibitors and antibiotics in dental plaques. J.A.D.A. 43:26 July 1951.

for the active ingredient to attach itself in loose chemical or physical union with the protein of the plaque, protecting it for from 12 to 24 hours against the acids of subsequent ingestions of sugar.

Some clinical experiments, particularly those of Zander,[7] have shown that this method may be used effectively in the prevention of clinical dental caries. Another investigator, Hill,[8,9] has shown that penicillin in an oil vehicle does not act in this manner. The method of application used by Hill was such that the availability of the penicillin to the plaque could be questioned. In the opinion of the author, penicillin will, if used properly, decrease the incidence of carious lesions.

When it became obvious that the plaque could be used as a retainer for the enzyme inhibitor, screening tests were devised for the selection of compounds which might be practical for incorporation into a therapeutic dentifrice. Screening tests indicate that at present there are several compounds that exhibit this property:[10] penicillin, chlortetracycline (Aureomycin), oxytetracycline (Terramycin), subtilin, some amino acid derivatives of 5-nitrofuroic acid, sodium N-lauroyl sarcosinate, sodium dehydroacetate, sodium N-myristoyl sarcosinate, (l-phenyl-l-decyl)-cinnamyl-dimethyl-ammonium chloride and l-phenyldodecyl-benzyl-dimethyl-ammoniun chloride. Of these compounds, only penicillin, sodium-N-lauroyl sarcosinate and sodium dehydroacetate have been tried on human beings over a sufficient period of time. It has been found that penicillin, sodium dehydroacetate and sodium N-lauroyl sarcosinate will prevent acid from forming below a potential of 5.6 in most individuals after a one-week trial use. A nine-month trial using sodium N-lauroyl sarcosinate seems to indicate an increasing effectiveness. With penicillin the effectiveness decreases with use, and with sodium dehydroacetate the potency appears to remain the same. When toxicity data are available on the other compounds that seem to satisfy the preliminary requirements, it is to be expected that these compounds should behave in a similar fashion. Thus it is apparent that enzyme inhibitors or substances which prevent the formation of acid on the tooth surface should be effective in the prevention of dental caries. Before any final conclusions are reached, however, clinical tests must be performed wherein the actual incidence of carious lesions is determined. Actually, clinical experiments of this type are now being carried out and the preliminary results are encouraging. As yet no published information is available which would indicate the effectiveness of these compounds against clinical caries. Thus it would seem that, as of today, tooth powder containing water soluble penicillin, with all of its undesirable characteristics, is the only therapeutic dentifrice now available to the American public.

7. Zander, H. A. Effect of a penicillin dentifrice on caries incidence in school children. J.A.D.A. 40:569 May 1950.

8. Hill, T. J.; Sims, J., and Newman, M. Effect of penicillin dentifrice on the control of dental caries. J. D. Res. 32:448 Aug. 1953.

9. Hill, T. J., and Kniesner, A. H. Penicillin dentifrice and dental caries experience in children. J. D. Res. 28:263 June 1949.

10. Fosdick, L. S., and others. A new approach to the problem of dental caries control. J. D. Res. 32: 486 Aug. 1953.

EFFICACY OF MEDICATED DENTIFRICES IN THE PRACTICE OF DENTISTRY

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Evidence that will provide an authoritative answer to the question as to how effective the popular use of medicated dentifrices has been in the prevention of dental disease is not available. Only the compilation of clinical observations made of carefully controlled groups of patients might contribute somewhat to information on the subject.

Could a dentist, conducting an average practice, gather data from which he could conclude that a certain medicated dentifrice had measurably reduced the incidence of dental caries? In the first place, "average" does not exist, since it is just an expression deduced from abstract mathematical relations between quantities. A survey[1] of the dental profession made in 1950 by the Bureau of Economic Research and Statistics of the American Dental Association sought to determine the "average" number of patients seen by dentists in their offices during the year 1949. The "average" number of patients reported was 933, which the Bureau admitted "appears suspiciously high." Even this high figure, when analyzed, may not provide an adequate number of patients suitable for long-term study so as to arrive at conclusive evidence.

GENERAL VARIABLES AMONG PATIENTS

The following general factors certainly would influence the ability of a general practitioner to study dental caries among his patients, no matter what method of control he chose for his study.

Age Distribution • Many of a practitioner's patients have passed through the susceptible teen-age period and, if the carious teeth have been properly restored, fewer surfaces remain to become carious. A large group of older patients have lost many or all of their natural teeth and this fact makes them unsuitable for study. Another large group of younger patients present newly erupted teeth which have not been subjected to the so-called "exposure-to-risk" period of at least two years.

Sample Size • After many of these patients have been culled out, thought must be given to how many cases must be included in order that the findings may be considered significantly different. A statistical analysis[2] has been made of the use of comparisons of averages.

Environment • For the sake of convenience, "environment" may be considered to include all conditions attendant on living, such as dietary habits, health and economic status, location and occupation.

Abnormalities • Tooth form, malposition of teeth, occlusal and jaw disharmonies serve as important predisposing factors to disease. An accurate measurement of these influences is not possible.

Patients Not Recallable • A certain percentage of a dental practice consists of

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1. Bureau of Economic Research and Statistics. Nineteen-fifty survey of the dental profession. Chicago, American Dental Association, 1951.

2. Chilton, N. W., and Fertig, J. W. Estimation of sample size in experiments. I. Using comparisons of averages. J. D. Res. 32:530 Aug. 1953.

individuals who seek dental care only for the alleviation of pain. These patients will not respond to any recall system and therefore cannot be used for periodic examinations.

Many other uncontrollable factors help augment the degree of error in evaluating clinical findings. Considering these inevitable sources of error, the experienced dentist cannot be blamed for scrutinizing critically an article which claims that the use of a certain medicated dentifrice resulted in a reduction of caries incidence of 39.9 per cent. Even though mathematically correct, it is the decimal fraction which truly mystifies him.

VARIABLES DEPENDENT ON ORAL HYGIENE

In an analysis of the possible effects the use of a medicated dentifrice may have on the carious process, the patients' desire and ability to cleanse their teeth must be considered. It is generally true that children lack the desire to brush their teeth. The majority of parents will attest to the fact that getting their children to brush their teeth regularly is just another worrisome duty. The duration of time children spend in toothbrushing and the number of teeth "hit" would certainly produce some freakish figures.

Later in adolescence the anterior teeth may begin to receive diligent care. Later still, many adults assume strict habits of oral hygiene largely in response to the admonitions of their dentist.

The ability to cleanse the accessible surfaces of the teeth is dependent on the type of toothbrush used as well as technic. No single brush or technic is acceptable to all dentists. Pits and fissures as well as the proximal surfaces of teeth with contacts cannot be cleansed thoroughly, yet these are the most common sites for caries to be initiated. Although not commonly used, dental floss and interdental stimulators do help disturb plaque formation near the contact points.

It has been stated that, "The most important ingredient in oral hygiene is 'time.' "[3] This has come to mean not only "how long?" but also "when?"

NONMEDICATED DENTIFRICES

Ordinary commercial powders and pastes consist essentially of abrasives and detergent substances with some flavoring agent. The type of dentifrice and the frequency of use must be determined by the dentist for a patient taking into consideration that individual's requirement. Relative abrasiveness of dentifrices is also dependent on the method of toothbrushing. Therefore, a combination of brushing technic with a dentifrice that is capable of keeping the teeth free from debris and stain usually can be found for the cooperative patient. Unfortunately, the latest data available on the abrasive qualities of commercial dentifrices is now ten years old.[3]

A recommendation by a certain practitioner[4] did not include a commercial dentifrice for home care. His formula was, "Elbow grease and water mixed in equal parts."

MEDICATED DENTIFRICES

Dentifrices impregnated with a medicinal substance are not used for the treatment of dental disease, but rather to prevent disease if possible. Therefore, the term "therapeutic" as applied to dentifrices is etymologically incorrect. This academic point is not the chief concern here, however. The question is whether the findings of researchers who conduct controlled studies can be transferred by the private practitioner to his patients who will not follow a similar regime. Even among investigators there is no uniformity

3. Epstein, S., and Tainter, M. L. Abrasion of teeth by commercial dentifrices. J.A.D.A. 30:1036 July 1, 1943.

4. Fenton, H. R. Toothpastes, powders, brushes and mouthwashes. North-West Den. 23:41 Jan. 1944.

in the procedures used for conducting a study of dental caries control. A conference was arranged by the American Dental Association to determine how reports on clinical studies may be standardized so that results may be compared. How then can the general practitioner compare his results with those of investigators?

If the directions which are printed on a carton of a popular dentifrice were followed steadfastly, dental caries could be arrested completely. The directions read, "For best results, use continuously." This would mean that a person could not be interrupted by eating or sleeping during his constant use of that product. But dentifrices are not commonly used more than twice a day and the ingredients remain in the mouth a relatively short period of time. To expect long-lasting effects from this occasional self-medication is presumptive. How often its use would be necessary to affect bacterial metabolism in dental plaques is questionable. Even the article[5] which discussed the most recent theoretical approach to caries control—namely, the use of enzyme inhibitors such as sodium N-lauroyl sarcosinate and sodium dehydroacetate—admitted that these substances "behave very similarly to penicillin in regard to the prevention of acid formation in saliva mixtures and in regard to retention on plaque material." It cannot be conceded that the clinical studies with a penicillin dentifrice have fully substantiated previous theoretical expectations.[6-8]

With the advent of antibiotics a new philosophy of "germ warfare" has been engendered. It is to destroy a lot of the "home-grown" bacteria rather than to learn how to live in harmony with them. A great variety of microorganisms are indigenous in the oral cavity. They form a kind of microcosmos—a harmonious and complex system complete in itself. By arbitrary dosage units, a dentifrice containing penicillin has been used to alter the type of bacterial population of the oral cavity, so as to rid the mouth of acid-producing bacteria and consequently lower caries activity. One study[6] of the supervised use of a penicillin dentifrice has reported a caries reduction of more than 50 per cent. This has not been corroborated by any other published report.

Conflicting reports on the caries-reducing properties of ammoniated dentifrices leave this type of medication in an unproved status. It has not been demonstrated that a dentifrice containing chlorophyllin has lowered the incidence of dental caries in humans.

No single factor concerned with the initiation of the carious lesion can explain completely the diversified clinical findings seen every day in dental practice. It is not entirely diet, nor is it the degree of oral hygiene. It is not any one type of bacteria, nor is it any particular tooth form or dental structure. Many patients seem satisfied with the simple belief that "their teeth are just soft." But an appreciation of the existence of multiple factors which, when combined, spell out that person's caries experience, is the kind of realistic approach the thinking dental practitioner will choose. He knows that dental caries cannot be controlled with a prescription pad. He waits for some method of mass control which will spring from fundamental research. Today he is able to prevent toothache; in the future he will be able to prevent the disease itself.

GINGIVITIS AND ORAL HYGIENE

It has been reported that a dentifrice containing chlorophyllin has reduced gin-

5. Fosdick, L. S., and others. A new approach to problem of dental caries control. J. D. Res. 32:486 Aug. 1953.

6. Hill, T. J., and Kniesner, A. H. Pencillin dentifrice and dental caries experience in children. J. D. Res. 28:263 June 1949.

7. Hill, T. J.; Sims, J., and Newman, M. Effect of penicillin dentifrice on control of dental caries. J. D. Res. 32:448 Aug. 1953.

8. Walsh, J. P., and Smart, R. S. Clinical trial of penicillin tooth powder. New Zealand D. J. 47:118 July 1951.

givitis in a group of male children.[10] To evaluate the substance present in a dentifrice as divorced from other hygienic factors is difficult. Inflammation of the gingiva due to poor oral hygiene or local irritants is a common finding in dental practice. Special drugs seldom are used for the treatment of simple gingivitis since the removal of local irritants results in a rapid improvement of the gingiva. Simple gingivitis in children is commonly seen around deciduous teeth prior to exfoliation and around partially erupted permanent teeth with deep gingival sulci. Such conditions often are transient and are not comparable with chronic periodontal disease seen in adults where periodontal membrane detachment, alveolar bone resorption and overmobility of the teeth are the more important clinical features.

The judicious use of the toothbrush rather than the type of dentifrice will contribute to the maintenance of healthy gingiva.

SUMMARY AND CONCLUSIONS

Multiple factors influence an individual's resistance to dental caries. In the most carefully planned clinical study of dental caries experience, many variables exist among patients which lead to inevitable sources of error. These errors are augmented by other uncontrollable factors peculiar to dental practice which prevent the general practitioner from accurately evaluating significant differences in caries incidence, irrespective of the method used for caries control.

Research findings from controlled studies cannot be duplicated in the dental office. It is difficult to divorce this subject of medicated dentifrices from the broad concept of hygiene.

Both positive and negative results concerning the effects of medicated dentifrices on dental caries experience appear in the literature. Until corroborated clinical evidence from several reliable sources is forthcoming, "prescription pad" control of dental caries cannot be accepted as an established office procedure.

Simple gingivitis is the normal inflammatory response of the gingiva to local irritants and treatment consists in the time-honored method of removing the causative agents.

9. Zander, H. A. Effect of penicillin dentifrice on caries incidence in school children. J.A.D.A. 40:569 May 1950.

10. McDonnell, C. H., and Domalakes, E. F. Effects of toothbrushing with dentifrices containing chlorophyllin on gingivitis. J. Periodont. 23:219 Oct. 1952.

DISCUSSION

Following the presentations of the five participants on the panel, the moderator declared a period of open discussion. Many members of the audience, estimated at about 1,800, took advantage of this period to ask the panelists to expand their views on certain aspects of the subject and to seek information on points not previously covered. Written questions, passed to the platform, were read and directed by Thomas J. Hill, moderator, to the designated panelist. The more pertinent questions and their answers follow:

Hill • If I may, I am going to start on the questions. The first question is, "What is most effective as a dentifrice, a paste or powder?"

Kesel • I think that there have been some studies made which indicate that for cleansing properties a powder is more effective than a

paste because of the fact that the cleansing agents are in a dry state and are not moistened or lubricated as in a paste vehicle. As far as use is concerned, I think individuals greatly prefer to use paste, and if one is depending on a dentifrice to get something into the mouth, probably patients get more of the paste and in a more satisfactory manner than they do when using a powder. Does that answer the question?

Hill • "Since ammoniated dentifrices increase the alkalinity of the mouth do they also increase calculus formation?"

Kesel • We have been concerned about that, and we have made observations to determine whether or not we are getting more calculus in the mouths of individuals who were using ammoniated materials. As yet we have not been able to detect any changes.

Hill • "Has it been determined in the United States and world-wide studies that certain bacteria are indigenous to the oral cavity as a well balanced harmonious system?" In other words, do we have a balanced oral flora that is advantageous?

Kniesner • Yes, I would think that as long as these myriads of organisms remain in a harmonious state in the mouth we consider that environment a state of health. A good example of upset of this harmony is given by some of the infections of the soft tissues, such as ulceromembranous gingivitis or Vincent's infection, in which organisms that are indigenous in the mouth go on a rampage because of a lowering of resistance. I would say that maintaining the harmony of the inhabitants of the mouth is an indication of good oral health.

Kesel • I believe that is a point that needs more consideration than it has received in the past. You ask if world-wide studies have been made on the subject. Offhand I can't think of any comparative studies that have been made on such a broad basis. I think they have checked the lactobacillus counts in Eskimos and other population groups. Dr. Fosdick has just checked them in the African Bushmen. But there are no correlated studies that I know of concerning total oral flora.

Hill • In other words, it is a question for which we do not have a complete answer.

The next question is, "Do anti-enzymes reduce the dental decay in hamsters?"

Fosdick • I believe there has been some work done on that at the University of Alabama. I imagine you would have to specify the inhibitor as several have been tested. For instance, penicillin, I believe, definitely did reduce caries in hamsters but the result from sarcosinate was questionable.

Hill • The same question has another part to it. "What is the difference between a regimented study and a carefully controlled clinical study?" I will answer that in order to save time. By the word "regimented" we should mean that the teeth are brushed under supervision, under regimentation. Of course a "carefully controlled study" is one that is set up with proper controls to compare with the experimental group.

The next question is "Do you think the anti-enzymes should be advocated to the public before they are thoroughly proved?"

Fosdick • I haven't decided yet whether or not they should be recommended to the public. Actually I believe they are going to work if they show no harmful effects and the toxicity is satisfactory. They have so many beneficial possibilities and can't do any harm. They might do a lot of good. I believe I would recommend them.

Zander • What do you mean by "recommend," Dr. Fosdick? Do you mean you would recommend them to dentists or to the general public through newspapers and magazines?

Fosdick • I merely said that I would recommend them.

Zander • If somebody goes out and says that this panel recommends the anti-enzymes, I want to be excepted from that recommendation.

Fosdick • I said that I, personally, think that they could be used without harm and I think they probably could do some good.

Kesel • I would like to go back to the problem of reporting or withholding experimental information. I think that scientists probably have an obligation to report what they are doing and what they have learned. I think they should do it before professional and scientific bodies and I don't think they should withhold information from those groups. On the other hand, I think that there should be some agency or some mechanism, either in the dental society or the Federal Trade Commission, or in the federal government somewhere, to see that the publication of the statements of the people who are responsible for the work are not misconstrued or amplified or go beyond the point that the scientists wish them

to go. As far as I know now there is very little of that checked. In fact, I have never been called as an expert witness to testify before an official body as to whether I would support or object to claims being made for ammoniated dentifrices. I believe that is a problem on which the House of Delegates of the American Dental Association or the Council on Dental Therapeutics should take a positive position, and they should see if they can't initiate some action.

Hill • "Do you know that part of the enzyme system is blocked by the sarcosinates?"

Fosdick • No, I don't, but something has been done along that line. The problem is not completely solved yet, but there are indications that they block the hexokinase enzyme.

Hill • "What is used for the clinical determination of the efficiency of chlorophyll in periodontal disease?"

Hein • I imagine that what the question is trying to get at is, what methods we have used to check this. McDonnell and Domalakes used a clinical examination and the PMA method of Massler and Schour. We have used, at Rochester, the method of Shourie and Day, checking the incidence of hyperemia, edema, proliferation and bleeding. I think it is strictly a clinical question. We have attempted to find some way of checking things like this in animals, but as yet I don't think we have any satisfactory animal we can use for laboratory work for gingival studies.

Hill • The question is relative. How would you estimate the correction of periodontal disease. How do you determine it—on the basis of inflammatory reaction?

Hein • Well, the studies that we have done have been confined to gingivitis and here we look for a change in the inflammatory reaction toward chronic forms and finally its elimination. This can best be noticed by signs of a decrease in hyperemia and edema, or if you have used the PMA method, you have a decrease in the attached and marginal areas toward the papillary areas and finally the elimination of those. I think that I would like to point out that anyone doing a gingival disease study would be very wise if they tried to make an attempt to rate each margin or papilla that has been examined on some sort of a severity scale because we also are interested in changes of degree. You are not only interested in a "yes" and "no" phenomenon, you are also interested in improvement. I think you can pick up signs of improvement much better by using a severity scale.

Hill • "Your basis of assumption is that the glycolytic scheme is the only major pathway for glucose degradation in the mouth. Other scheme pathways are known, such as the hexose monophosphate shunt which can produce acids and which essentially circumvent the Meyerhof pathway." Will you comment on this briefly?

Fosdick • There are two or three schemes by which the carbohydrates can be degraded, and perhaps more. The only one that I know of that produces a lactate is the Meyerhof scheme, while the other schemes produce acids which are not particularly harmful for the tooth surface.

Hill • "Can a tooth paste with anti-enzymes be used and the patient have no fear of too much sweets?"

Fosdick • I certainly do not know the answer to that question. I do know that the enzyme inhibitors protect againt a 50 per cent sugar solution on the tooth surfaces. There are other conditions. If thick viscous resinlike materials stay on the tooth surface for long periods of time you may not get protection. Furthermore, the ingestion of sweets is not simply a caries problem. I certainly would not recommend that you go on a sugar jag if you are using an enzyme inhibitor for the prevention of caries; you may end up with a very bad dietary deficiency.

Hill • "In at least one area in the United States a 5 ppm fluoride mouthwash is being prescribed as a caries preventive." What is the opinion of the panel as to the validity of this procedure?

Kniesner • I know of no published evidence indicating a dentifrice containing fluoride has resulted in the lowering of caries incidence in humans.

Hein • I think the use of such a mouthwash by adults could be seriously questioned mainly because we have so very little evidence regarding the effect of fluorides on adult caries. I think for children there is a possibility that it may have some beneficial effect. Recent work that Dr. Brudevold did at the Eastman Dental Dispensary with the low levels of fluoride suggests that 1 ppm solutions saturate the tooth surface very quickly *in vitro*, so it might be possible that a very dilute solution will saturate the tooth surface *in vivo*, but as

clinical evidence is not yet behind us I think we should wait until experiments are concluded before the procedure is generally recommended.

Zander • I understand, Dr. Hein, that rinsing your mouth with a 5 per cent sodium fluoride solution has no effect whatsoever on caries.

Hein • In view of the present evidence, you are correct in emphasizing that my remarks are speculative, Dr. Zander.

Hill • "Does sodium bicarbonate affect the growth of acid-forming bacteria?"

Kniesner • Yes it does, and it was shown by Bruckner, I think, that it will affect the lactobacillus counts. I threatened at one time to give a paper at a research meeting. One might make a lot of enemies doing it, but if I had a paper entitled, "The effect of certain hydrocarbons on the numbers of oral lactobacillus," I could pick out some kind of a gasoline with some diluent and rinse my mouth with it, which I know would effect a lowered lactobacillus count. In fact, I happen to smoke a pipe and cigars and after I do I don't think any self-respecting bacteria would stay in my mouth.

Hill • "Should the mouth be rinsed vigorously after the use of an anti-enzyme tooth paste?"

Fosdick • I suppose it could be. I see no necessity for not rinsing. These things are absorbed quite rapidly and I, personally, when I brush my teeth, rinse my mouth afterwards. If you don't particularly care to do so, it is not necessary. Either way, I think the idea is to have these materials come in contact with the tooth surface for a short period of time after which, from then on, they can't be washed off readily.

Hill • "If dental plaques are so important when considering the etiology of caries, why have not the past enzyme inhibitors including vitamin K, urea, penicillin, and so on, truly reduced the incidence of dental caries since they have been shown to combine with the dental plaque material?"

Fosdick • I have not seen any evidence to indicate that vitamin K, ammonia, urea or chlorophyll will combine with the dental plaque. In fact, we have evidence to indicate that probably the reason they don't work is that they don't combine with a dental plaque and are not retained in the mouth for more than 20 to 30 minutes.

Hill • "Do the enzyme inhibitor materials have any effect on the natural digestive enzymes of the mouth? I believe that ptyalin is one of the important oral enzymes. Does it affect this enzyme?"

Fosdick • I think you will have to be more specific in your question because many of the enzyme inhibitors do affect oral enzymes and gastric enzymes. As far as we can find out through toxicity experiments on animals no harmful effects have been observed.

Hill • "Where do the manufacturers of tooth pastes get their figures, with mostly animal experiments and little clinical evidence?" I think that is a fairly general question. Perhaps I can answer that myself—it varies greatly from one manufacturer to another. The next question is: "How do the lay articles on anti-enzyme dentifrices obtain their data on the effectiveness of the clinical studies? I think they don't."

Fosdick • If they have obtained data on clinical studies these studies were performed by someone other than myself. I have not seen any data to that effect as yet, and I don't have my own data as yet.

Hill • "What are the influences of these conflicting tooth paste claims on the fluoridation program? If these claims are to be believed, they tend to decrease the need for fluoridation."

Fosdick • I would like to comment on that. It seems to me that if we will accept the acid theory of tooth decay, then an ideal combination would be the fluoridation of water which will make the tooth more insoluble toward acid, and the use of some procedure whereby we can reduce acid formation. Under those conditions we will have some sort of a synergistic action where the results are additive. I think that would be a very fine idea.

Zander • I think it is unfair to mix up anti-enzymes and fluoridation in this discussion, just as I think it was unfair in the *Saturday Evening Post* article to combine these two problems.

There are some excellent clinical studies going on all over the country on what fluoridation of water supplies will do in the prevention of dental caries. My knowledge of anti-enzymes comes from what I read in the *Journal of Dental Research*, what I have heard today, and what I read in the *Saturday Evening Post* and other journals. The *Post* article stated that clinical studies had

been started and were under way on telephone operators and college students. These studies and studies on fluoridation are two things that are, as far as I am concerned, as far apart as night and day. We, the dental profession—and I like to be identified with the dental profession—have spent a lot of time and effort in educating the public through dental research by setting up controlled studies; for example, on public health measures like fluoridation of water supplies for the prevention of dental caries. In such a study, in which we start on children at birth, we can study them for years to come. Most of these studies have been set up for 10 years, and many of them have been going for from 6 to 7 years. To compare such a study on young growing children with a study on several thousand telephone workers and college students is confusing the issue, I think. The adults in the latter study have already had most of their caries experience and cannot be compared because no two have the same number of restorations or open carious lesions in their mouths. To compare these two types of studies and mix them together is, I think, confusing the issue.

Fosdick • I did not say that this point was settled. I said that if we believe in the acid theory of dental caries, then there should be a synergistic action because I believe, and I think a lot of people believe, that if it could be possible to decrease the rate of acid formation and at the same time make the tooth more resistant to acid, we would certainly have a very fine combination. I am not saying that the enzyme inhibitors will do that, but that from a theoretical point of view they should. I am not trying to detract from the public health studies on fluorides, but if we could get a substance that would decrease the rate of acid formation on the tooth surface and at the same time make the tooth surface more resistant to acids we would have a synergistic effect.

Kniesner • I think I know what may have been going on in the mind of the questioner. It may be something like this: Since all these claims are put into such an attractive form to the public, will it adversely affect the program of artificial fluoridation of water which is certainly not complete in the country? Is there a need, therefore, for fluoridation when the anti-enzymes will take care of it in time? If this is not true, it makes you think that the advertising campaign for the dentifrices is much more attractively presented than the fluoridation program with all its data which is acceptable.

Hill • May I remind you, gentlemen, that fluorine is an enzyme inhibitor too, so it is not entirely separate.

I will have time for just one more question, I think. "Since you all seem to infer that dental caries is entirely and completely lactobacillus and sugar all your references are in that direction. Can other organisms and vitamins contribute?"

Kesel • I believe that there are many things that contribute to the caries picture, including other organisms and other food nutritional elements. However, I think a tangible means that we have available and that has been shown time and time again to be correlated with caries activity is the lactobacillus count and sugar consumption and until there is better evidence which will eliminate these agents from the caries picture I think we will have to accept them as etiologic agents or at least as associated with the etiology of the disease.

SUMMARY

Thomas J. Hill, Cleveland

I have prepared a short summary of what the speakers have said and wish to discuss certain points.

PENICILLIN

Dr. Zander's excellent discussion on the use of antibiotics in dentifrices leaves the impression that this is not a desirable method of applying therapeutic agents. Perhaps it would be well to leave this part of the discussion at this point were it not for the implication that were these dentifrices used as directed, they might have greater value. Both Dr. Zander and Dr. Fosdick suggest that, in selected cases of rampant caries under proper dental supervision, this dentifrice may have value as a therapeutic agent.

Both Dr. Zander and I and my coworkers have conducted clinical experiments using penicillin dentifrices. Dr. Zander's experiment resulted in better than a 40 per cent control of caries and we accomplished no control in an unregimented experiment, and a questionable or borderline control with a regimented program. It is difficult to correlate these investigations. Dr. Zander and I are seeking an explanation of these differences. The unregimented experiment which Dr. Kniesner and I conducted perhaps represents something near the unregimented use by the public.

The regimented experiment which I conducted that gave a 10 to 15 per cent control was on the borderline of being statistically significant. It has been suggested that this experiment might have had a better result if a form of penicillin more soluble than the procaine salt or a vehicle other than oil had been used. This does not appear to be a valid criticism for the following reason. Dr. Zander has stated that the theory behind a penicillin dentifrice is its antibacterial effect on the oral flora known to be associated with the production of acids. Dr. Fosdick has said essentially the same thing; that is, that the value of penicillin in a dentifrice is due to the interference of metabolism of bacteria within the dental plaque. Inasmuch as the development of resistant strains of organisms has been essentially the same regardless of the penicillin salt or the vehicle used, it would appear that its effects on bacteria and on bacteria metabolism are comparable.

I agree with Dr. Zander that the development of sensitivities does not appear to be an important problem, and that at present there is some question that the penicillin-resistant organisms that have developed during these experiments is of great clinical significance. It must be admitted, however, that the development of resistant strains of oral streptococci, particularly the hemolytic streptococci, is undesirable and of some potential danger. Inasmuch as the evidence of the value of a penicillin dentifrice is not conclusive, it would appear that its use is at best experimental and accompanied by potential dangers. It may be concluded, then, that regardless of its possible value in selected cases of rampant caries, a penicillin dentifrice in the hands of the public does not offer a practical method of dental caries control.

AMMONIA

The paper on ammonia by Dr. Kesel is more in the nature of new evidence of the usefulness of ammonia than a survey of the present status. It would appear that there has been little change in the status of this material as an ingredient of dentifrices. The evidence presented by

Dr. Kesel deals entirely with its influence on lactobacillus counts and not on caries control *per se*. Such evidence should be accepted at its value and for what it contributes toward the study of mouth flora. Dr. Kesel did not intend to imply that this evidence established its value as a therapeutic dentifrice.

CHLOROPHYLL DERIVATIVES

Dr. Hein's paper shows clearly the difficulty of making an accurate evaluation of the chlorophyll derivatives in a therapeutic dentifrice. The variability in chlorophyllin products applies to purity rating, copper content, ability to inhibit acid formation and ability to deodorize. This may well account for the conflicting evidence of their usefulness. Dr. Hein significantly points out that caries control must be based on clinical demonstration. He states that the usual screening tests to determine the bacteriostatic influence, the power to inhibit acid formation, the effect on lactobacillus counts and on the depression of dental caries rate in laboratory animals are not adequate to allow one to judge their ability to decrease the dental caries rate in humans. A demonstration of their value in dental caries control is lacking up to the present.

The evidence regarding their value in a dentifrice for the prevention or control of gingival disease likewise is conflicting, and further work with more standardized products is needed in order to establish their value. Dr. Hein states that some chlorophyll derivatives do have deodorizing properties when proper concentrations are used. He suggests that much additional work is needed before the therapeutic value in a dentifrice is established.

ENZYME INHIBITORS

The theory that dental caries could be inhibited or controlled by the use of an enzyme inhibitor in dentifrices is an intriguing and fascinating speculation. However, this theory should be viewed in the cold light of critical analysis.

Perhaps it would be well to consider for a moment what is meant by the acidogenic theory of dental caries. There seems to be ample evidence that people who are susceptible to caries have a different bacterial flora from those that are resistant. This would indicate that the acids formed by carbohydrate degradation are associated with bacteria or bacterial metabolism. My conception of this process is that these enzymes are not liberated by bacteria to produce the acids by a chemical process which proceeds within the saliva outside the cells, but that the acids are formed as a product or byproduct of bacterial metabolism and are formed within the cell bodies. This is a process similar to metabolism of carbohydrates in the human body. If one of these systems of carbohydrate degradation can be blocked, the organism becomes inactive or dies.

There are many substances known that have the ability to block the common pathway of enzyme metabolism. Examples of these are menadione (vitamin K), glyceric aldehyde and penicillin. Two questions arise. First, can substances be found that will prevent glycolysis in bacteria but will not cause a similar interference with metabolism in the human host. Second, it is known that in the use of antibiotics when one pathway of metabolism is blocked, some organisms are capable of establishing a new pathway of metabolism by using a different system of enzymes. In this manner a strain of bacteria which would be resistant to the enzyme inhibitor could become prevalent in the mouth.

The problem naturally arises as to whether such a method of caries control would develop a different strain of organisms in the mouth with a different system of enzyme that would produce acids by an equally good method of glycolysis.

Enzyme inhibitors are an extremely interesting possibility for therapeutic dentifrices, but their *in vitro* demonstration will have to be augmented by proof of their safety and by clinical evidence of their continued efficiency in the control of dental caries.

Perhaps this symposium could be summarized as follows: There is some evidence that the bacterial flora of the mouth can be affected or influenced by the incorporation of various substances within dentifrices. It is not definitely established that the effect on the bacterial flora is of a permanent nature, nor is it definitely established that dentifrices as used by the public materially decrease the dental caries rate because of any specific therapeutic substance incorporated in them. It would appear that the present advertising claims of dentifrices are inclined to lead the public to put too much faith in some incorporated ingredient rather than on the prophylactic value of the dentifrice.

In the final analysis, therapeutic dentifrices are attempts to prevent disease by the constant use of drugs. This is not the usual way to control diseases. Historically, success in the control of various diseases has been by eradication of the specific causative organisms, by the elimination of their carriers, or by raising the resistance or immunity of the host to the organism causing the disease.

All methods which depend on the constant use of drugs, regardless of their effective value, must be considered substitutes for a better understanding of resistance and susceptibility, for a better understanding of the host-parasite relationship which makes these diseases possible.

With the exception of the use of fluorides, all the methods that have been advocated for dental caries control depend in part or in a large measure on the cooperation of the patient. It would appear, then, that any method to control dental caries must be not only sound in theory and demonstrable by clinical investigation but must be practical in office manipulation and effective under the common or usual conditions of use.

Research—Basic and Applied • Rethinking of present division of research responsibilities is recommended by Julius A. Stratton, vice-president and provost at Massachusetts Institute of Technology, Cambridge, Massachusetts. "Traditionally, we have looked to the universities for the advancement of knowledge, and we depend upon them largely for all research into the fundamentals of science. To industry falls the task of applying new knowledge to useful ends and of furthering research and development focused on new materials, processes, and products. . . . Government encourages research of all kinds with a view to development of new weapons and supports a variety of investigations in such fields as agriculture and public health. But all this chain of obligations hangs upon fundamental research, and the future vitality of countless enterprises depends upon the soundness of our national effort in this domain. The responsibility for the support of basic science cannot be delegated wholly to the university; it must be shared by industry and government, by business and by the public at large." *Industrial Research Newsletter, August 1953.*

An approach to the problem of facial pain

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There is increasing recognition on the part of the dental profession of the widespread incidence of facial and oral pain of an obscure nature and of the grave significance of such pain in terms of human welfare. It is becoming more and more obvious that the dentist must seek to increase the efficacy of his service through a deeper understanding of the nature and characteristics of pain, somatic and psychosomatic, and of effective methods of diagnosis, therapy and prevention.

The need for clinical analysis, teaching and research in this field led to the establishment of the Consultative Oral and Facial Pain Service at the University of California, College of Dentistry. Within the dental group primarily concerned in this service, the specialized functions represented are those of anatomist, oral surgeon, diagnostician, pathologist, and psychologist. Consultative services in other branches of dentistry, as well as specialists in neurology, internal medicine, otorhinolaryngology, and so on, are available as required.

The following presentation is based on a selected group of cases handled recently. One case has been chosen to form, as it were, the central plot of this presentation. This case is discussed in considerable detail. It will illustrate the necessity, in the presence of complex conditions, for adequate preliminary study and for caution in diagnostic categorization, as well as for repeated review and analysis during the period of treatment. Further, it will illustrate the principle that, in cases of obscure pain, it is often essential to combine diagnostic testing and actual therapy. Other cases will be referred to briefly in order to demonstrate either variant responses in instances of somewhat similar symptom complexes or problems of differential diagnosis.

PRINCIPAL CASE HISTORY

An unmarried, retired schoolteacher, 63 years old, had as her chief complaint persistent pain of the left side of her face, focusing in a roughly triangular area—its base the upper edentulous ridge margin from the midline to the left cuspid area, its apex approximately at the ala of the nose (Fig. 1).

During several appointments, this tense and deeply distressed patient offered the following history in rather fragmentary form. In 1929, because of a basal meta-

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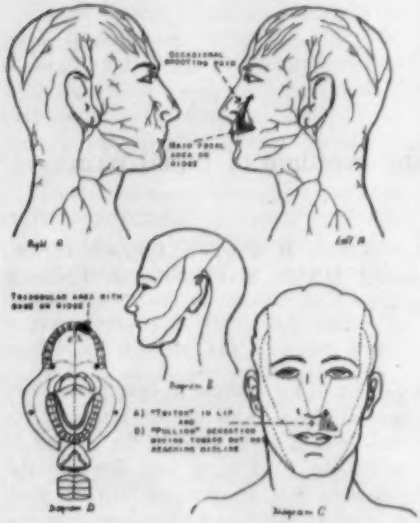

Fig. 1 • Pain pattern as described by 63 year old schoolteacher

bolic rate of 20 and protrusion of the left eye, a portion of the thyroid gland had been removed. Subsequently, a physician told her, or at least implied, that this operation had been unnecessary. She claimed there had been no improvement after the operation; rather, she described cardiac symptoms and a prolonged period when she had the sensation of absence of taste. Electric treatments of an undescribed nature had been given by an osteopath in 1932 without favorable outcome. A hysterectomy, including one ovary, had been performed in 1939, and an ovarian tumor had been removed in 1941. No hormone therapy had followed these operations. Her tonsils had been removed in 1942 with subsequent improvement of her health. She is convinced that her previous ill-health stemmed from the tonsillar condition. In 1945 a sister had died of influenza. (Psychological connections between this event and subsequent history were suspected during history-taking.) In 1944, the patient had begun to follow a popular dietary program[1] which she has continued to date, although in recent years she has not followed it closely except with regard to yeast and cod liver oil. She has taken multiple vitamin capsules for some time and claims to "have had no colds for three or four years."

In January 1948 she had insisted that the dentist remove her remaining upper five anterior teeth, and she states that he reported she had a chronic infection connected with the upper left incisor. Immediate denture service was given, but the denture was not comfortable. She had used this or a remade denture intermittently until about the middle of 1949. She claims she had experienced discomfort from wearing it.

In 1949, she stated, the pain was of a "pulling" nature. It persisted, and a physician consultant told her that he thought there had been a nerve injury. Her dentist, disagreeing, had sent her to a neurologist. This had been followed by a number of visits to medical men. One stated that it was not a tic; one saw no value in operating on the ground that the condition would not be relieved; another dismissed her with the remark "some stand it better than others"; one physician diagnosed the condition as a tic and gave an alcohol injection. This, she claimed, had been extremely painful and the condition had been made worse. Another physician informed her bluntly that it was "all in your mind." Her resentment at this statement apparently had never subsided and still colored her recital of this portion of the history.

The patient's last comprehensive medical examination in 1949 was noncontributory from the physical standpoint (occasional swelling of knuckles and ankles, normal reflexes, no food or drug allergies). The physician indicated his opinion that the orofacial condition was psy-

1. Hauser, G. Look younger, live longer. New York, Farrar Straus & Young, Inc., 1951.

chosomatic in origin. About this time (1949) she had noted a "twitching" of the left side of the upper lip. Several months later there had been a hemorrhage of the left eye. This had been accompanied by pain under the eye. On referral to a dentist, intraoral films had been taken with negative findings. The vitality tests of all remaining teeth had been within physiological limits. Shortly after these events, she had become acquainted with a method of "relaxation" of the eye. Apparently she has followed the prescribed ritual since that time.

In March 1950 she had consulted another dentist to whom she gave a confused picture, telling him of the lip twitching and the ridge pain pattern already described. Further roentgenograms had been taken and the findings were essentially negative. In the anterior ridge on the left, however, there had been noted an area which remotely suggested the existence of a small portion of retained root. The area had been opened and explored but no fragments had been found. The patient is convinced, however, that a portion of root had been left in her jaw previously, and to this she now attributes all of her difficulties. The dentist, reporting on the above operation after referring to his files, stated merely that exploration, with negative results, had been performed. The patient, in describing the event, claimed that the doctor had said "Never in his life had he seen such a serious condition." This dentist reported that he had made a left infraorbital injection, but the patient had been unable to tell him if the pain and "tugging" sensation was reduced thereby. Finally, the upper denture had been remade in the hope of improving the condition. The dentist stated that during this period the patient consulted many physicians, a number of whom prescribed narcotics. He expressed his belief that she had taken an inordinate amount of codeine over the past two years. He had not been able to determine whether her problem was fundamentally organic or psychological.

The family history was noncontributory, apart from the psychological significance of the patient's reaction to her sister's death. Her mother died at 87 of pneumonia, her father at 66 of cancer of the rectum and her sister at 68 of influenza.

CLINICAL EXAMINATION

Clinical examination revealed little objective information, the significant aspects being subjective. The patient's face was that of an anxious and depressed individual. There was a twitch of the mouth and nose to the left side, irregular but persistent, which was seemingly related to the sensation of the pulling of a "loop" in the lip. At subsequent examinations the patient would vary the description of the pain, sometimes complaining of a more extended pattern from the left maxillary tuberosity to the symphysis. Description of her distress commonly involved the terms "cutting," "pulling," "tugging" and "the loop." The patient repeatedly expressed the conviction that if only the "loop," extending from the left ala of the nose toward the midline, would shift medially, the "pulling" sensation would diminish and she would be greatly improved.

At first, mere contact of an instrument with the ridge mucosa in the left central incisor-cuspid area elicited a reaction of "intolerable pain."

As already indicated, the upper jaw was edentulous; the lower jaw was dentally intact with the exception of the third molars and the right first molar. There were no temporomandibular joint symptoms. The patient reported that wearing of the upper denture somewhat lessened the pain.

Roentgenographic examination included routine intraoral films, maxillary occlusal and anteroposterior head films.

Intraoral films taken in 1949 and in 1950 were available for comparison. Moving picture records were taken of typical facial expressions.

GENERAL COMMENTS

From the onset it was strongly suspected that psychogenic factors played a considerable part in the pain picture. It became important, therefore, as in a large percentage of cases of obscure facial and oral pain, to differentiate between and to evaluate organic and psychogenic aspects of the problem.

Discussion • Desirable as it is to make an appraisal early in the handling of a case, the determination often is most difficult and even dangerous. Clinical knowledge is scanty, not only in regard to the etiology and diagnosis of obscure organic lesions but also in regard to the role of psychosomatic influences in specific cases. It is all too easy to ascribe a pain pattern to purely psychological origins. Such an error would be matched only by the converse approach in which simply the organic status is brought into review. A judicious restraint is desirable and this should be coupled with a search for comprehensive and reliable tools by which efficiency can be enhanced. There are perhaps few cases in which obviously dominating psychogenic factors operate in the entire absence of some basic organic disturbance which serves as a "nucleus." On the other hand, there are a few cases of long-standing and exhausting organic pain in which no psychogenic factors have developed to affect the threshold of pain, its intensity and its significance to the individual.

DIAGNOSTIC-THERAPEUTIC APPROACH

Subsequent studies in the case under discussion were directed toward a multiple objective: (1) the search for possible organic factors and for local functional or other disturbances, (2) the evaluation of psychogenic influences, (3) the alleviation of pain, (4) the establishment of greater stability in patient-dentist relations in order to assist the diagnostic process.

Discussion • Common peripheral mechanisms responsible for orofacial pain include[3] (1) distention or displacement of pain-sensitive vascular structures; (2) sustained contraction of skeletal muscles; (3) relative ischemia of various structures—for example, in the region of the gasserian ganglion or striated muscles; (4) unusually vigorous contraction or distention of a muscle, especially in parts of the digestive and genitourinary tubes; (5) pulling, pinching or displacement of connective tissue structures, including periosteum and dura, and (6) inflammatory reaction. These mechanisms serve as a basis for the diagnostic therapeutic measures to be discussed.

Diagnostic-therapeutic measures useful in cases of orofacial pain are of several categories and comprise:

1. Regional block or infiltration with local anesthetic. These injections are used to interrupt afferent impulses. The usefulness of procaine injections in the differentiation of direct and referred pain patterns is obvious, since injection into superficial or deep regions to which pain has been referred does not reduce its intensity, whereas injection into the area, near or remote, which is responsible for the referred pain will result in its alleviation.[3-5]

Moreover, since in the areas of referred pain there seems to be a lowered threshold to ordinarily non-noxious stimuli, the local injection of procaine will eliminate hyperalgesia to such secondary irritation as the frictional contact of clothing on an area of referred pain in the neck region. Placebo injections—for example, a normal saline solution—may aid in establishing the existence of significant psychogenic factors. Procaine in oil and "depot" injections may be used with caution to provide prolonged action. It is a fortunate finding,[6,7] confirmed by many clinicians, that repeated injections of procaine frequently will lead to cessation of pain over periods of time far exceeding the recognized pharmacologic activity of the anesthetic, even producing in some instances semipermanent results.

2. Wolff, H. G., and Wolf, S. Pain, ed. 2. Springfield, Charles C Thomas, 1949, p. 66.
3. Wolff, H. G., and Wolf, S. Pain, ed. 2. Springfield, Charles C Thomas, 1949, p. 31.
4. Lewis, Thomas. Pain. New York, Macmillan Co., 1942, chap. 15.
5. Langley, L. L., and Cherkin, E. Physiologic foundation of dental practice. St. Louis, C. V. Mosby Co., 1951, p. 125.
6. Wolff, H. G., and Wolf, S. Pain, ed. 2, Springfield, Charles C Thomas, p. 68, 31.
7. Livingston, W. K. Pain mechanisms. New York, Macmillan Co., 1944, p. 112, 113.

2. Dietary and nutritional analysis and corrective measures.[8, 9]

3. Use of vasoconstrictor drugs. Administration, on a test basis, of vasoconstrictor drugs such as ergotamine tartrate (under usual precautions) to observe the effect of diminished pulsation of arterial vessels, of antispasmodic drugs such as meperidine hydrochloride or atropine, of sedative drugs to relax muscles or increase local circulation, of analgesics to raise the threshold of perception of pain, of vitamin concentrates, especially members of the B complex group, to alter neurologic metabolism.

4. Physiotherapeutic measures.

5. Special intraoral measures. The restoration of lost vertical dimension (on a permanent basis with prosthetic appliances, or temporarily on a test basis with latex splints) can be used in cases where the pain patterns involve the temporomandibular articulation and careful study suggests such "test therapy."

6. Alcohol injection. This method is frequently used at the present time to provide prolonged relief from pain without actual severance of the nerve. The similarity of its effects to those obtained by nerve resection make it a valuable preliminary adjunct to surgery.

7. Neurosurgery. An example of this measure is the avulsion of the mandibular nerve.

8. Psychiatric interview. Experience has shown that such technics as the psychiatric interview, the Minnesota Multiphasic Personality Inventory (MMPI)[10] and the Rorschach test have made it possible to differentiate functional from organic pain components with a high degree of reliability. It seems likely, therefore, that further study along these lines may result in the evolution of simple and more specific tests which could be administered in the dental office.

DIAGNOSTIC-THERAPEUTIC MEASURES USED IN PRINCIPAL CASE

In the case being discussed, a number of the diagnostic-therapeutic approaches described were employed. Numerous procaine and lidocaine injections, regional blocks and infiltrations were given. The results of these injections were, in some instances, distinctly favorable in terms of pain alleviation and diagnostic usefulness; in some instances the results were negative and confused. Meperidine afforded relief during the period of its pharmacologic action but, of course, could not be continued indefinitely; ergotamine tartrate and other drug therapy did not afford consistently effective results. Dietary measures produced little change over the considerable period of observation. There was an unmistakable over-all trend toward improvement in the status of the patient, however, punctuated by periods of striking advance and of recession. It became increasingly evident that the disturbance was predominantly psychogenic.

Discussion • Hyperkinesia in the area of the face and neighboring muscles is rather common, but little is known of its cause, pathogenesis or treatment. It would appear that psychic tension and voluntary movements of the face accentuate the tic. A useful clinical distinction can be made between facial tic and facial spasm. The tic, as stated earlier, usually is found in persons prone to psychogenic disorders; it is a co-ordinated, repetitive, seemingly purposive and obsessive act which virtually becomes automatic. This type of patient requires the services of an understanding psychiatrist or psychologist. Facial spasm usually is an organically precipitated contraction of a single muscle or of a group of muscles. The actual cause of the hemifacial spasm is unknown.[11]

REACTION

The reaction to one step in the early diagnostic-therapeutic program was illuminating. Anesthetization of the painful area with procaine-in-oil resulted in a rather unfavorable local reaction, but nevertheless it provided valuable information. As soon as the anesthetic had taken effect, the patient acknowledged the remission of the pain in the area.

8. Jolliffe, N.; Tisdall, F. E., and Cannon, P. R. Clinical nutrition. New York, Paul B. Hoeber, 1950, p. 3, 179.

9. Simmonds, Nina. When is a skeleton nutritionally retrievable? J. Pros. Den. 2:746 Nov. 1952.

10. Minnesota multiphasic personality inventory, developed by S. R. Hathaway and J. C. McKinley. Minneapolis, University of Minnesota Press, 1943.

11. DeJong, R. N. Neurologic examination. New York, Paul B. Hoeber, 1951, p. 513.

The pain was absent for several days, but the patient's complaints did not diminish. Instead they focused on the "pulling, tugging" sensation. Use of this technic of anesthetization is valuable prognostically in cases where neurectomy is contemplated, since it gives the dentist an opportunity to observe the attitude of the patient for several days under sensory conditions almost identical with those which would result from surgery. In this case it was clear that the patient sorely needed some symptom about which to complain; this information made it possible to eliminate alcohol injection or neurectomy from the plan of treatment.

CONTRAST CASE 1

The following case is a contrast to the one already described in which accumulated evidence discounted the likelihood of organic disturbance. A woman, 59 years old, originally complained of puffiness of the face. She had consulted a physician and a dentist, and the physician "on chance" had recommended extraction of the upper right third molar. According to the patient there had been considerable trauma during the surgical treatment which was followed by a period of difficult healing. Later, she had experienced continuous, diffuse, aching pain in the apical regions surrounding the upper and lower teeth on the right and left sides. This condition sometimes prevented the patient from going to sleep readily, more because of nervousness than because of pain. She complained of increased intensity of pain on clenching the teeth. Clinical examination revealed considerable overstress in the right lateral incisor and molar area because of the loss, without replacement, of the lower cuspid and the first and second bicuspids. Traumatic movement of the teeth in function was obvious, and there was general attrition. All teeth, except one bicuspid, were extremely hypersensitive, many giving painful response at the lowest scale reading on the Vitalometer. Since the onset of the facial pain the patient had learned to avoid both hot and cold foods.

On subsequent visits the patient was treated with several lidocaine injections in the upper and lower jaws, alternating between sides. These gave relief in the injected quadrant only during the period of action of the anesthetic. Because of this, and also because of the clinical presence of advanced attrition and abrasion and the subjective symptoms of hypersensitive teeth, it was decided to give some local desensitizing treatment. Gottlieb's zinc chloride-potassium-ferrocyanide-silver nitrate impregnation technic was employed. After several applications to all of the teeth the patient reported freedom from pain and discomfort. The patient was advised that subsequent reapplications might be needed. After an interval of complete freedom, slight distress occasioned a second impregnation. Several months later the patient reported continued absence of all distress. The diagnosis was hypersensitive dentin caused by the rapid advance of attrition and abrasion which had outstripped the normal pulpal protective mechanism. The relation of the secondary complaint to the original complaint probably was coincidental.

CONTRAST CASES 2 AND 3

The temporomandibular joint, although seemingly not involved in the first case described, frequently plays an etiologic role in facial and oral pain. A commonly recognized involvement of the temporomandibular joint in pain patterns is that in which the vertical dimension of the jaws is altered with consequent malposition and malfunction of the condyle and adnexae. The following two cases illustrate the pain problem in (1) episodal injury to the joint, (2) bruxism, affecting both teeth and maxillomandibular relations, coupled with steep incisal and cuspal interference.

Contrast Case 2 • The patient, a woman, in a humorous social situation opened her mouth widely and bit down on a whole carrot. Pain immediately ensued. Four months later she came for treatment with the complaint of a persistent, deep, "shooting" pain focused in the left mandibular molar region and radiating to eye and ear regions on that side. She stated that little diminution of the pain had occurred since the original episode, although a "popping" sensation, which she described as being toward the angle of the mandible, had almost disappeared. Examination added nothing of significance to the history of the carrot episode. It was obvious, however, that psychic factors also entered into the picture. The patient was in the menopause, with some of the frequently associated symptoms. She had been apprehensive of malignancy with regard to the facial pain pattern.

The patient was informed of the etiology of the case, reassured as to her fears and instructed in the importance of strict limitation of mouth opening. The possibility of inter-

maxillary wiring for stabilization was discussed. On a subsequent visit the evidence of neurotic behavior was demonstrated clearly, and this was frankly discussed with her. A week later she telephoned to report that on the day after her last appointment the pain had completely disappeared. She referred gratefully to what she called the "pep talk" and promised meticulous care in restriction of jaw motion. Complete recovery is anticipated in this case. The prolonged healing period is attributed, in part, to inadequately limited jaw movements and in part to the psychological effects of her own evaluation of, and reaction to, the situation.

Contrast Case 3 • A rather tense 42 year old business woman, with exacting supervisory duties, was referred with the complaint of severe, intermittent pain which affected the left side of the mandible and occasionally extended to the left side of the maxilla. In her physical background were an allergy to various foodstuffs, a so-called "nervous breakdown" ten years previously, followed by a hysterectomy. Her dental history included an average amount of restorative treatment and the removal, seven years previously, of the four third molars one of which, the lower left, presented complications which had required transfer of the patient, in midoperation, to an oral surgeon. This incident had greatly upset the patient physically, and she persisted in the belief that a part of her jaw had been removed. Mandibular pain, similar to toothache, had been noted first two years previously. The pain was referred to the left third molar area and it varied in duration and periodicity; occasionally it involved the left side of the maxilla. The most disturbing aspect of the pain pattern was the tendency of the patient to awaken at night. The pain had prevented further sleep unless drugs were used. The patient had been conscious of a temporomandibular "clicking" which was not accompanied by pain but she was unaware of any habit of bruxism. Her head position in sleeping was unrelated. Oral examination revealed a disturbed occlusal pattern with noticeable lateral and incisal interference, and function was restricted to an up and down masticatory stroke. Pressure of the upper teeth against the lower accompanied attempts at lateral movement, especially in the left first molar region. There was subluxation of the left temporomandibular joint, with slight deviation to and limitation of motion on the left. The pattern of occlusal wear suggested the possibility of bruxism exerted particularly on the left side. This suspicion was strengthened by obvious signs of psychic tension. Intraoral and temporomandibular joint roentgenograms were noncontributory.

Preliminary treatment consisted of gross adjustment of occlusal interference to excursive movement. The possibility and the significance of bruxism were discussed and a latex splint was constructed to be used as a protective and diagnostic aid. The splint was to be worn over the lower teeth at night and at other times as seemed feasible. In four days the patient reported a degree of relief and she confirmed the suspicion of bruxism. In approximately one month she was entirely free of pain at night and was conscious only of intermittent residual discomfort during the day. It is probable that full relief will follow the elimination of bruxism and the completion of occlusal equilibration.

COMMENT

Early in the course of the contact with the first patient described, the reliability of reported symptoms was suspected. This suspicion grew as we became better acquainted with the patient. The description which she offered at the outset suggested the possibility of psychological factors. No physiologic or anatomic basis could be postulated which would account in a satisfactory way for her sensation of a "cord" running from the supraorbital region down along the side of the nose and forming a loop in the maxillary ridge. This "cord" and its terminal loop were referred to again and again by the patient in an almost obsessive way and she became convinced toward the end of our contact with her that the "loop" was moving toward the midline. She felt that if only this "loop" could be enticed across the midline, it would "break up" and her discomfort would cease. Her reports of the pain pattern, history, and so on, were often confused and contradictory, but her description of the "pulling, tugging sensation" related to this "cord" remained constant and consistent throughout the contact with her.

Her history of medical and dental treatment was extensive. As nearly as could be determined she had sought the advice and services of 25 to 30 dentists

and physicians. She had undergone several surgical operations and various other forms of somatic therapy such as the "electric treatments" administered in 1932 by an osteopath. This aspect of her history is suggestive of the phenomenon described by Menninger[12] as "polysurgical addiction"—a neurotic insistence on unnecessary surgical treatment. This type of behavior he found to be accompanied consistently by strong guilt feelings and to be highly indicative of a neurotic personality structure. Closely akin to this was the fanatic dedication to a ritual of eye exercises. She talked about these exercises with conviction and suggested that glasses could be discarded if her relaxation exercises were adopted. Her description of these exercises was interesting, and the bizarre nature of her comments approached delusional quality at times. She talked about attempting to see a perfect "I" and went on to say that any tension made this impossible, and therefore anyone who could see a perfect "I" had attained a state of complete relaxation. She described, with facial contortions and gestures, the subjective experience of attempting to "get inside" a printed "e" and all this was said with the greatest sincerity.

With this growing attention to her deviant psychological characteristics, we began to look more closely at all of her behavior. Many aspects of her history as well as her clinically observable behavior and symptomatology began to fit into a consistent pattern. She was a retired schoolteacher, a spinster of 63 years. She had been closely attached to her mother, whose maternal role seemed to have been taken over, in part, by the sister who died of influenza in 1945. Her general behavior was not extremely inappropriate but would certainly justify the term eccentric. Her concern with her body—diet, eye exercises, polysurgery—when viewed against the background of the total picture which seemed to be developing, suggested a serious neurotic structure. It was decided to investigate this possibility more thoroughly, and to this end a Minnesota Multiphasic Personality Inventory and a Rorschach Test were administered along with an unstructured psychiatric interview.

The results of these tests confirmed the suspicion that the problem being dealt with might be psychogenic pain. The MMPI profile shown (Fig. 2, left) is a classic picture of a severe hysterical psychoneurotic. It suggests a person whose emotional tensions and conflicts are discharged through the mechanisms of body concern or physical symptoms rather than being directly expressed as anxiety or depression. Women with similar personality profiles typically express their hostility toward others by inviting aggression and then using this aggression to provoke feelings of guilt in the aggressor. The tests indicated a somewhat distrustful person who seemed to be exerting herself to appear in as good a light as possible.

Figure 2, right, shows this patient's MMPI profile superimposed on the mean profile of eight cases, taken at random, of psychogenic oral or facial pain in women who were subsequent patients in the Oral and Facial Pain Service. The similarity of the profiles is striking and suggests that not only is a somatic syndrome present in many cases of oral and facial pain but a psychological syndrome as well.

The patient's performance in the Rorschach test was consistent with the MMPI results and confirmed the suspicions of a psychoneurotic basis for the pain picture. The record showed an extremely defensive person with a noticeable lack of emotional maturity. She has many impulses and feelings which she cannot accept and for which she can find no safe and satisfying means of expression. The content of her responses indicates that she has considerable dif-

12. Menninger, K. A. Polysurgery and polysurgical addiction. Psychoanalyt. Quart. 3:173 April 1934.

ficulty in handling sexual feelings, as well as a great fear of emotions in general and masculine figures in particular. Her behavior during the test showed her primary defense technic to be one of disowning responsibilities and attempting to shift the burden to the shoulders of an outside figure. When this proved inadequate she took refuge in immature and typically hysterical behavior, and as this too proved inadequate, she displayed certain schizophreniclike characteristics. This seems to indicate the direction in which the patient would move, should she become more severely disturbed.

We now had strong confirmation for our initial hypothesis and considered the use of hypnosis as a diagnostic aid. This technic usually is effective in the manipulation of hysterical symptoms and the hypnotic state ordinarily is more easily induced in hysterical patients than in many other types. Hypnosis was attempted but it was not possible to obtain sufficient depth to make any definite tests. This probably was because of the element of suspicion running through the patient's behavior as well as her deep fear of men and her inability to relax with them. While hypnosis did not prove to be a usable tool in this case, it has been found to be of inestimable value in the diagnosis of other cases handled in the pain service.

CONTRAST CASE 4

The following case illustrates one of the ways in which hypnosis can be a useful clinical tool. A woman, 31 years old, complained of a painful mass in the sublingual region of her neck. Clinically there was a hard, swollen area roughly 5 cm. in diameter in the midline of her neck beginning just below the inferior border of the mandible. Any pressure on this area elicited emphatic reports of pain from the patient. As the history was being taken it was noticed that the patient was unusually tense. The lateral muscles in her neck were contracting spasmodically, and her voice was hoarse and quavering. She told of her father's death, one year before, from laryngeal carcinoma, and her subsequent fear of cancer. The swelling had been diagnosed by one dental surgeon and one otolaryngologist as a tumor,

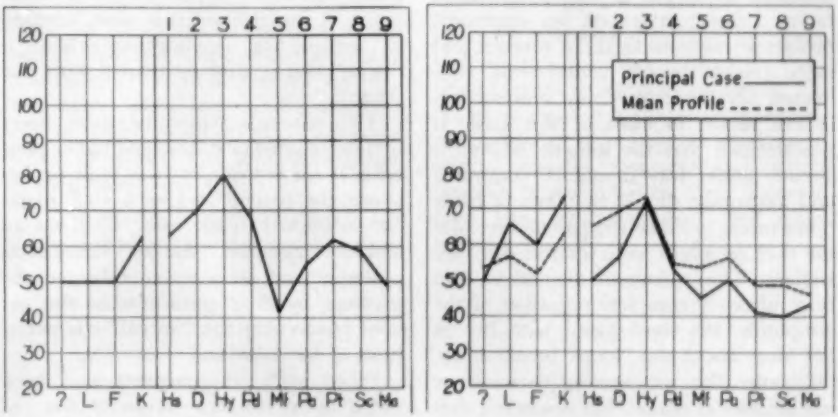

Fig. 2 • Left: The classic picture, according to the MMPI profile, of a hysterical psychoneurotic. The four scores, ?, L, F, and K (question, lie, validity and "suppressor variable") are used as an aid in judging the meaning of the other scores obtained. The other scores are: Hs, hypochondriasis; D, depression, Hy, hysteria; Pd, psychopathic deviation; Mf, masculinity-femininity; Pa, paranoia; Pt, psychasthenia; Sc, schizophrenia; Ma, hypomania. Right: The MMPI profile of 63 year old teacher superimposed on mean profile of eight patients with psychogenic oral or facial pain. Note similarity of profile

and a biopsy had been suggested. On palpation the swollen area felt much like a muscle in a state of spastic contraction. The patient was easily hypnotized and was told that when the operator rubbed his finger gently over the swollen area the muscle in her neck would relax and the swelling and pain would disappear. When this was done the swelling completely vanished in a period of not more than 15 seconds and when the patient was awakened she reported complete freedom from pain. This patient was treated psychotherapeutically by one of the authors and a detailed report of the psychodynamics of the case will appear in a later publication. This case serves to illustrate the use of hypnosis to rule out the possibility of a neoplasm without having to resort to biopsy. It should be noted, however, that had the swelling not disappeared no conclusions could have been drawn one way or the other.

PLAN OF TREATMENT AND PROGNOSIS

At a conference of the staff it was decided that the pain in the case of the 63 year old teacher described first probably was due in large part to emotional factors. It was felt, however, that the patient's age as well as her personality structure made for a poor prognosis as far as a direct attack on her emotional problems was concerned. In younger and more pliable people competently conducted psychotherapy may produce excellent results in cases of this kind. It was decided that the somatic treatment already under way should be continued and advantage should be taken of every opportunity to make the patient feel that the staff members were interested in her welfare. This treatment seemed to lead to a relatively complete remission of the symptoms. We went along with her in her ideas about the "loop" breaking up. Of course this was serving to reinforce her delusional system, but it was felt that little could be done to help her attain a better general adjustment and that much better results could be had with regard to her physical complaint if use was made of her psychopathologic state rather than to attempt to oppose its influence.

DISCUSSION AND SUMMARY

In recapitulation, the members of the pain clinic staff feel that it is not possible to allocate specifically the agents responsible for the patient's improvement, or to assay the comparative importance of each one. The frequent relief from pain after multiple procaine injections is in harmony with current neurological findings. Drug therapy offered palliative relief but did not clarify the etiology, and, of course, an indefinitely prolonged drug regimen was highly undesirable. The systematic exclusion of local or systemic organic or functional factors, the varying responses to procaine injections and medication, the psychological evaluation and the over-all behavior of the patient during the entire course of treatment would seem to underline the psychological aspects of the case. Although specific psychological treatment was not given (in view of the indications that the patient probably would be noncooperative), yet the entire treatment program might be said to follow a carefully prepared plan from the psychological standpoint. It was realized that pain, whether of organic or psychogenic origin, is "pain," and it must be treated with due regard.

The patient's symptoms were never underestimated or disparaged in her presence. A sincere rapport was built up between the patient and each staff member concerned in her case. This was an absolute essential. Earlier consultants probably had seriously complicated the problem by their comments to the patient concerning the "unreal" characteristics of her ailment.

When such improvement had been noted as to warrant return of the patient to her home in a distant state, she herself was permitted, for psychological reasons, to fix the date for cessation of treatment. She was referred to a carefully chosen dentist in her home city for supervision. Subsequent reports received,

covering a period of over one year, confirm both the original analysis of the case and the guarded optimism as to its prognosis.

CONCLUSIONS

1. The study of obscure oral and facial pain—its analysis, diagnosis, prognosis and therapy—is not only a legitimate field of activity in the practice of dentistry, but constitutes a responsibility which the profession cannot ignore or relegate entirely to other allied health fields. It constitutes an area in which the interest of the dentist, the physician, the psychiatrist and the psychologist are mutual and complementary. It does not presuppose the assumption, by the dentist, of authority or concern beyond the bounds of modern concepts of dental education and practice.

2. Effective performance within this field on the part of the dentist demands a broad approach, comprehensiveness and meticulous detail in examination, case history taking, and the orderly, step-by-step eliminative process of differential diagnosis. This must be based on a reasonable familiarity with those aspects of local-systemic interrelationships, of neuroanatomy, physiology and pathology, and of psychogenic disturbance pertinent to the direction of, and participation in, pain case-management.

3. An approach to the philosophy and practical study of facial and oral pain is presented through the discussion of a few case histories, one of which is described in detail, the others only in outline.

4. Awareness of the possibility of the existence of both psychological and organic factors makes it imperative that each of these potential factors be given appropriate emphasis in case management. Experimentation with diagnostic psychological tools, such as personality inventories and other tests, may lead to the development of practical aids in dentistry for the determination of disturbed states and of the necessity, or otherwise, for specialized consultations.

5. Under the conditions indicated earlier, the general practitioner of dentistry who includes within his purview the study and treatment of obscure oral and facial pain may, notwithstanding the limitations of current knowledge in this field, reasonably anticipate a substantial degree of successful achievement, if not in the complete restoration of physiologic conditions, at least in the alleviation of suffering and the restoration of function.

6. An understanding and humanitarian attitude is indispensable to the successful handling of pain problems. The reality of pain as a subjective phenomenon, whether of organic or psychogenic origin, must be recognized and optimal rapport between patient and diagnostician must be established and maintained.

Diagnosis of Cancer • The *Atlas of Tumor Pathology* is a cooperative project of the National Research Council and the Armed Forces Institute of Pathology and brings together illustrations of all the different varieties of cancer, thus providing a powerful aid to the pathologist upon whose decision the treatment of the patient with cancer depends. Since the pathologist deals with physicians and surgeons rather than directly with the patients, few people are aware of how important it is that the pathologist have this type of information readily available. *Mary Ruth Oldt, "Atlas of Tumor Pathology," News Report 3:53 July-August 1953.*

The relationship of dentistry to speech

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Since the production of intelligible, normal speech is dependent on conditions in the oral cavity, the dentist is the guardian of one of humanity's greatest faculties. Speech defects can be caused by any of the following factors: (1) malocclusion, (2) loss of teeth, (3) prognathism, (4) tonguetie, (5) cleft palate, (6) shortness of soft palate, (7) dentures or bridges planned without regard for phonetic consequences, (8) fear of showing unsightly dentition.

MALOCCLUSION

In general, persons with malocclusion have difficulty in producing sounds involving certain of the following letters: S, Z, R, L, F, V, P, B, M and Th. In persons with Class 2 malocclusion, a form of jaw relationship often referred to as the "Andy Gump" type, usually the S and Z sounds are the most characteristic speech defects. The more or less mechanical cause for the failure to pronounce these sounds correctly is obvious. In the production of sibilant sounds, normal occlusion permits a certain amount of air to escape between the arches. If the air space is too large, as in a case of a Class 2 malocclusion, too much air is permitted to escape—unless, as it will be explained later, the tongue compensates for the excessive passage of air—and the S and Z sounds are distorted.

When, as in a case of open bite, the upper anterior teeth of an individual do not even closely approximate the lower anterior teeth though the posterior teeth are in occlusion, the individual sometimes has difficulty in producing F, V, P, B, M and Th. Mechanically, the difficulty consists of the inability of the patient to extend the lips and tongue sufficiently to make these sounds. Sometimes the S and Z sounds also are defective in those open bite cases for the same mechanical cause responsible for these speech defects in cases of Class 2 malocclusion.

The Class 3 or so-called "bull dog" type of malocclusion usually results in a generalized difficulty with any or all the sounds already mentioned. Mechanically, the difficulty is one of more or less interference with the bite, with the tongue movement and, to a lesser extent, with the lip movement. Occasionally a closed bite causes a speech defect because it allows the tongue too little space for normal movement.

There are, of course, individuals with malocclusion who speak without defects. Either these individuals have been taught to use compensatory tongue placements and movements and possibly have had re-education in lip movement; or, consciously or unconsciously, they have taught themselves to compensate for the malocclusion. The determining factor in these different situations remains uncer-

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tain. At present, a long-range study of the problem is being made. It is possible that some factor such as the individual's intelligence plays a part in determining whether the person can compensate automatically for his mechanical oral disability; perhaps imitation in an environment of good speech has improved the individual's speech.

On the other hand, there are individuals whose oral mechanical apparatus is normal and who nonetheless possess a speech disability. In these cases faulty tongue and lip placement and movement may be caused by such factors as childhood imitations, subnormal intelligence, physical or mental illnesses or poor habits. It is hoped that the long-range study will throw more light on this problem.

LOSS OF TEETH

The loss of teeth, particularly the upper anterior teeth, is responsible for almost the same type of mechanical difficulties as the Class 2 and open bite types of malocclusion. In general, loss of the upper anterior teeth tends to distort certain or all the sounds mentioned except the R sound. The cause is practically the same as that in the open bite and Class 2 malocclusion cases, namely, too much space for the escape of air and to a lesser degree too great a distance for the lips and tongue to have to extend to produce the sounds. The same cause operates though with less effect when the lower anterior teeth are missing.

The question is often asked, "A five or six year old child has lost his upper anterior deciduous teeth and has difficulty with the sounds F, V, S, Z and Th. Should this child be sent to a speech clinic?" The answer is that most speech clinicians prefer to treat the child after his permanent upper anterior teeth have erupted fully. At that time the oral mechanical condition of the child may be such that the speech difficulty no longer exists.

PROGNATHISM

Recordings of the speech of patients before and after the surgical correction of prognathism provide interesting comparisons. The speech defects of prognathous individuals do not seem to follow a definite pattern. Some individuals produce the same defective sounds already mentioned in connection with the usual Class 3 malocclusion. Others produce a generalized "muddling" of speech, caused by interference with the tongue movement space. Here again is a more or less mechanical speech problem which can be corrected by the oral surgeon (Fig. 1).

TONGUETIE

Tonguetie is another cause for speech defects. The condition can be corrected by a surgical operation in which the oral surgeon releases the lingual frenum. The characteristic defective sound caused by tonguetie is Th; the mechanical cause of this speech difficulty is the holding down of the tongue tip so that the tongue cannot reach forward between the incisal edges of the upper and lower anterior teeth to do its part in the production of this sound.

Most authorities today believe that virtually no children who have been able to suck adequately and whose condition has not been detected during their stay in a modern hospital are too "tongue-tied" to produce normal speech. It appears that most of the children who have defective speech due to this cause were either born at home or in a small rural hospital.

CLEFT PALATE AND SHORTNESS OF SOFT PALATE

Patients with cleft palate and those with insufficient or "short" soft palates are unable to make any sounds correctly except M, N and Ng. This inability is due to the fact that for the production of

normal speech the nasopharyngeal space must be closed—that is, the end of the soft palate at the uvula must touch the posterior wall of the pharynx at Passavant's bar—in the production of all sounds of the English language except M, N and Ng. In the production of these three sounds, however, the soft palate drops down toward the base of the tongue; and the nasopharyngeal space, which is the isthmus connecting the nasal cavity with the oral cavity, is kept open.

Dentistry enters into this picture when either the oral surgeon by surgical means provides the patient with a soft palate of proper length and flexibility or the prosthodontist constructs an obturator to substitute for the missing organic parts (Fig. 2, 3 and 4).

DENTURES AND BRIDGES

Faulty denture construction is a rather deceiving phrase when used in connection with speech defects because a denture may be perfect from the standpoint of appearance, comfort and function and still possess one or two slight flaws which distort the wearer's speech.

Some people lisp when they first wear an upper denture because of the foreign nature of the material which covers the area lingual to the upper anterior teeth. Most people with normal hearing, however, can learn to compensate for the appliance and are able to produce sounds against an object without surface sensation, unless, as sometimes happens, the covering of denture material is much too thick. In some cases the upper denture has artificial rugae applied to an anterior palatal area which was already too thick. In some of these cases, the patient never seems to be able to compensate for the appliance with tongue movements and placements. After sessions of speech re-education under the care of a qualified speech therapist, many such patients do return to their former normal speech, but the quickest way for the dentist or the prosthodontist to help these patients to regain their normal

Fig. 1 • Correction of prognathism. Left: Before surgical correction. Right: After correction. (Courtesy of Edward Reiter, Mount Sinai Hospital, Cleveland)

Fig. 2 • Surgical repair of cleft lip and cleft palate. Left: Before operation. Right: After operation. (Courtesy of Edward Reiter, Mount Sinai Hospital, Cleveland)

speech is to make the necessary correction in the upper denture or to construct a new denture.

Sometimes the slant or contour of the denture in the area lingual to the upper anterior teeth is so different from that of the original mouth condition that the patient's speech is defective. This condition is more serious in the older denture patient; that is, it is more difficult to correct it with speech therapy or re-education. For this type of defective speech also, the best treatment is for the dentist to correct the denture.

Practically the same problems of thickness and contour arising in regard to complete upper dentures may occur in regard to upper partial dentures which cover the area lingual to the upper anterior teeth. It is quite easy, however, with a metal casting type of partial denture to avoid the so-called horseshoe shape and to put the partial bar back toward the posterior boundary of the hard palate where the tip of the tongue meets no interference in normal speaking.

Resetting the upper anterior teeth in an uneven line to make them look more natural sometimes causes a speech defect for much the same reason already mentioned in connection with malocclusion and missing upper anterior teeth. The following case is an example of such a situation.

A 60 year old man had worn complete upper and lower dentures for 15 years. He had them relined once; and when they became loose-fitting again, he was interested in having a new set made. The dentist showed the patient that he could make him a more natural-appearing set by staggering the upper anterior teeth. His old set had the upper anterior teeth arranged in the conventional straight manner. The patient was delighted with the new appearance, but he had an articulatory speech defect from the moment that the new dentures were placed in his mouth. The dentist assured him that he would get over the speech difficulty within two or three weeks. When months went by, however, and the patient still lisped, he was sent to a speech therapist. The therapist could probably have succeeded in teaching the patient to compensate with his tongue for the air openings which the crooked line of upper anterior teeth produced, but a series of therapy sessions would have

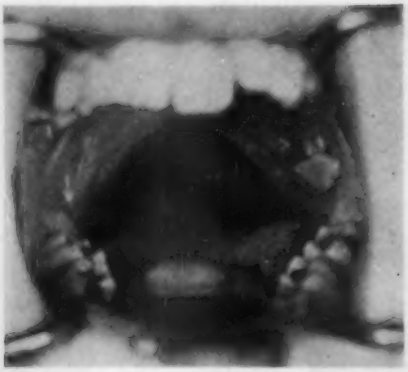

Fig. 3 • Palate showing good surgical closure of anterior part but insufficient length of soft palate

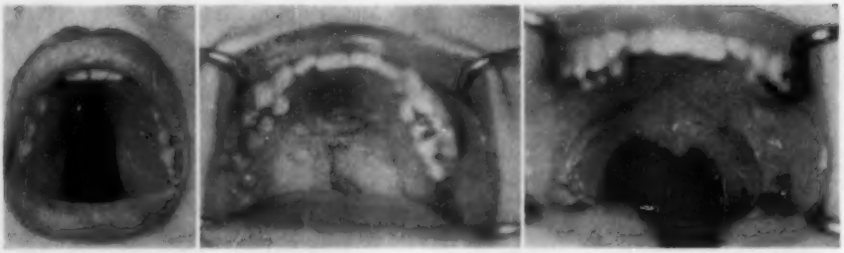

Fig. 4 • Surgical repair of cleft palate. Left: Anterior portion of palate before operation. Center: Anterior portion of palate after operation, showing hard palate completely closed. Right: Posterior part of palate after operation, showing soft palate of normal length and flexibility

been necessary to accomplish this. The trouble and time needed for this speech correction did not seem worth while to the patient; consequently, he returned to his dentist and asked to have the upper anterior teeth reset in the former straight, less natural-appearing style.

Polish and smoothness of the denture are sometimes factors to be considered in correcting or preventing a speech difficulty. Occasionally, stippling the labial surface of an upper denture, while it does make the appearance more like that of the natural gingiva, may cause frictional interference with the upper lip which distorts normal articulation. It is surprising that the correction of so minor a factor as polish on an upper denture can correct a speech defect.

FEAR OF SHOWING UNSIGHTLY DENTITION

Dentistry has a part to play also in the correction of certain speech disorders which are due to psychological factors such as the fear of showing an unsightly dentition. The following example is fairly typical of such a situation. Ann is 12 years old, and her parents have never

taken her to a dentist regularly. Rampant decay has destroyed large portions of her anterior teeth. Her half-articulated, mumbled syllables are a direct result of the fear of showing her unsightly dentition while she is speaking. In performing the necessary dental services for this child, the dentist not only is rehabilitating the child from the dental point of view but also from the point of view of speech and personality aspects.

CONCLUSION

In general, most cases of defective speech are handled best by full cooperation between the dentist, physician, orthodontist and speech therapist. There are, however, many cases of defective speech which can be corrected by the general dentist if he supplements his knowledge of the dental sciences with some knowledge of speech production.

Essential requirements for effective research in dental therapeutics

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Although the Council on Dental Therapeutics and other evaluating agencies endeavor to present informative reports and considered opinions as early as possible after a product appears on the market, the dentist often encounters an item before such information can be published. This situation may result from several factors:

1. The evaluation process which the Council must employ in order to provide the profession with a critical appraisal is necessarily time consuming.
2. Occasionally a product is placed on the market before its usefulness has been rigorously tested.
3. Evidence provided by the manufacturer is sometimes inadequate or unsound, from a scientific viewpoint, and judicious evaluation of the product is not possible.

The Council has attempted to minimize this problem by modifying its classification system[1] and by encouraging firms to present information on their products at an early date, preferably before the product is placed on the market. It is believed that the following report will serve to improve the situation further.

This paper is intended to present certain important principles that should be followed in assessing the safety and usefulness of therapeutic agents and devices.

This paper has been authorized for publication by the Council on Dental Therapeutics.

Assistant secretary, Council on Dental Therapeutics, American Dental Association.

1. Council on Dental Therapeutics. Revised procedure for the evaluation of dental products. J.A.D.A. 40:489 April 1950.

As an outline of the Council's considerations, its purpose is twofold:

1. It may serve as a guide to the individual who is interested in developing a more critical approach in appraising the reports which come to his attention in the professional literature and in the promotional material that he encounters. As such, it may be helpful to the practitioner and the undergraduate student.

2. Manufacturers and distributors of therapeutic items are disturbed occasionally by the fact that evidence, which to them appears adequate for the support of their advertising claims, is not adequate when examined by the standards of scientific evaluating bodies. It is hoped that this outline will be of assistance in forestalling misunderstanding and in obtaining acceptable evidence from future research investigation.

Because many of the subjects to be considered are covered comprehensively in any of several textbooks, detailed technical discussion has been kept to the minimum, but reference is made to suitable sources.

OVER-ALL CONSIDERATIONS

Safety and usefulness are the two primary considerations in assessing the value of a therapeutic agent.

Safety • It should be demonstrated clearly that the agent is safe under conditions of normal use. Drugs may produce harmful as well as favorable pharmacological effects under the common conditions of use. For example, prolonged use of cortisone may result in serious physiological disturbances; hydantoin, employed in the treatment of epilepsy, frequently is associated with gingival enlargement; and the regular use of opiates may lead to addiction. Other materials produce side effects that may not be directly related to their primary biologic activities; these side effects may be evident as physical or chemical irritation, as sensitivity responses or as general malaise and discomfort. For these reasons, the undesirable features which may accompany the use of a drug should be established clearly and assessed with respect to its safety for clinical use.

The evidence should demonstrate also that there is a safe margin of difference between the maximal effective therapeutic dose that may be required and the minimal harmful or toxic dose of the agent. Accidental overdosage occasionally does occur and if a drug possesses high toxicity it is potentially dangerous.

The evidence should demonstrate further that an otherwise safe product does not combine with metabolites, or with extraneous substances that may be encountered in the course of its administration, in such a way as to form an unsafe compound or mixture. When the therapeutic material is compounded with a vehicle, it must be established also, by these same criteria of safety, that the vehicle is not injurious and that the complete preparation is safe.

Animal tests are invaluable for screening out highly toxic drugs, and the use of animals is probably the most convenient and most common means of preliminary testing for toxicity and safety. Direct observation in human subjects is essential, however, for final evaluation of these characteristics of a product intended for human use.

Somewhat different criteria of safety must be applied to the consideration of therapeutic devices. A device must not be hazardous to the patient or to persons who use it, with respect to the possibility of injury from fire, steam, electricity, poisonous gases, sharp edges, explosion or other causes. It should not be injurious, either by physical or chemical action, to the tissues with which it comes in contact when in use.

Devices that are intended to penetrate into the tissues or body cavities should be so constructed that they will not break

off under forces even exceeding those encountered in normal use.

Usefulness • The usefulness of a product must be evaluated in the light of its safety, as established in accordance with the criteria outlined in the foregoing section.

A drug may be useful for experimental or for therapeutic purposes, or for both.

The experimental usefulness of a substance depends on its potential applicability toward research in either laboratory or clinical studies, not necessarily therapeutic in character.

In order to qualify for therapeutic usefulness, however, an agent must be useful in the treatment, prevention or diagnosis of disease in human subjects. In this respect a substance may be effective as the primary curative or palliative agent, such as insulin in diabetic hyperglycemia or an antibiotic in specific infectious conditions; or it may be effective as a secondary agent, such as anesthetics, sedatives or dressings, all of which are employed in connection with surgical procedures as adjuncts to other more direct and more important therapeutic measures.

With regard to usefulness, the ability of a device to satisfy the claims that are made for it generally should be determined by methods similar to those employed for drugs. In the case of devices, however, it sometimes may be difficult to perform so-called "blind" studies.

KINDS OF THERAUPEUTIC AGENTS

A simple gross classification of therapeutic agents may serve as a point of orientation at this juncture.

The field of therapeutic agents encompasses materials which may be (1) biologically active, (2) chemically active or (3) inert, and includes those devices which are of value in the diagnosis, treatment or prevention of disease.

A substance may be considered to be biologically active if its administration gives rise to alteration of a living system, or part thereof, by interference with existing metabolic mechanisms. The gross alteration produced by a biologically active material is not usually effectuated directly by a simple gross chemical or physical reaction, but occurs as a secondary and often far-reaching result of a simple initial reaction. This is exemplified in the action of hormones and poisons whereby the introduction of minute quantities of material into the organism may result in a primary interference at one stage of a single enzymatic process within certain tissue cells, with consequent secondary disturbance of other processes. An entire chain of reactions is thus altered, and the over-all effect on the whole organism may be profound.

Some materials may be considered to be chemically active but metabolically inert. Drugs employed as protein precipitants and cauterants, as well as acids and alkalies, may be classified as chemically active materials. These materials have limited usefulness in dental therapeutics.

Still other agents are considered inert both biologically and chemically in the foregoing senses. This group includes cotton dressings or bandages, abrasives, simple ointments, certain solvents and other vehicles, and all materials or devices whose effective action is based primarily on physical considerations.

GENERAL CONSIDERATIONS AND CRITERIA TO BE OBSERVED IN OBTAINING EVIDENCE

The sections which follow are intended to furnish insight into salient principles that should be observed in considering the acceptability of evidence in support of claims for the usefulness of therapeutic agents.

Proof of Therapeutic Usefulness • In order to be useful in the treatment of disease, an agent should be safe under

all the conditions outlined in a preceding section.

Ultimately, proof of therapeutic value must be based on sound, factual evidence that clearly demonstrates that the product has been significantly influential in facilitating the diagnosis, or in preventing the development, or in hastening the remission of the human disease or condition for which its use is recommended. It is not valid to assume that effects obtained *in vitro* or with animals constitute frank proof that a product will be satisfactory when employed in human beings.

Characteristics of Sound Factual Evidence • Evidence should be an organized accumulation of pertinent objective factual observations, rather than of subjective opinions. Evidence should be free from experimental or personal bias. The methods and means employed to establish the facts should be logical and scientifically satisfactory, and should be described in the presentation of evidence in such a detailed way that the conditions of the study may be duplicated minutely by other competent investigators who may desire to do so.

When qualitative differences are measured between individual subjects or units, the criteria for differentiation should be defined clearly and their limitations should be noted.

When quantitative differences are measured, the differences between reported observations should be significantly greater than differences that may have arisen as a result of experimental error, or uncontrolled variation among the individual units under study, or chance. These factors are discussed in later sections.

DESIGN OF EXPERIMENTS

Experimental and Nonexperimental Research • The over-all objective of research is to relate observed effects to their causes. In investigations of a nonexperimental type, such as population surveys and many sociologic studies, the investigator exerts no influence over the factors involved, but endeavors to secure a representative and adequate sample of the population under study. Statistical methods are available which, when competently applied, enable the investigator to obtain good, representative samples and reliable results from this kind of study.[2-8]

In experimental research, on the other hand, the investigator usually exerts a large measure of influence over both causative and environmental factors, and it is of the utmost consequence that he be aware of the importance of rigorous control of his subjects throughout the entire course of his experiment. In chemical or physical laboratory studies, in which the materials employed in the investigation are usually quite stable and uniform, and where variations may be measured and checked with relative ease, good scientific training usually supplies the logic and accuracy that are necessary for designing and performing careful experiments. Even when laboratory conditions cannot be controlled to precision, the extent and the limits of the variation can be ascertained and reported, and the results can be examined in the light of the demonstrated departures from uniformity.

In experiments involving animals or other living organisms, however, in which variation between individual subjects is

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likely to be common, it is most important that the investigator be aware of such variation at all times, and attempt to compensate for it in organizing the study.

Materials • The material under investigation must conform to certain standards and it should be checked periodically during the experiment.

To avoid the possibility that effects may be produced by impurities, the test material shrould be in a highly purified state and should be checked frequently during the course of the study. When ultimate purification is not possible, the exact composition of the final product and the nature and relative proportion of impurities should be known completely. Characterization of an impure agent is possible by the use of any of several chemical and physical tools that are available today. Chemical analysis, spectrophotometry, chromatography, or electrophoresis are only a few of the methods that may be utilized to establish the uniformity and similarity of composition of most preparations that will be encountered. In fact, there is rarely a legitimate reason why a new product cannot be reasonably well characterized, and there is no scientific excuse for keeping secret the nature of a new agent.

The material should be of uniform quality and of homogeneous composition so that dosage may be controlled with accuracy. In order to provide further evidence of relation between effects and causes, the presence of adequate amounts of the material at the site of its supposed activity should be demonstrated conclusively, when possible. For example, if a new drug is said to be active against bacteria traveling in the blood stream, its concentration in the blood should be determined periodically after injection.

When a therapeutic agent eventually is made available for general use, it is frequently supplied in combination with a vehicle which may contribute to convenience in its administration or to the stability of the active substance during storage. Consequently the final clinical testing of the product should be performed with a preparation that is identical with the form in which it will be distributed for clinical use. In this event, so that there can be no doubt that the observed effects are due solely to the active agent, the vehicle should be biologically inert. If it is not inert, other experiments should be run simultaneously, using a number of different vehicles, in order to establish whether the ultimate results are due to the material being tested or to some unsuspected property of the vehicle itself. The test material, of course, should be compatible with its vehicle, and should be active in the form in which it is administered.

Obviously, in the case of mixtures, a knowledge of their complete composition is essential.

Variation • No two living beings are exactly alike, and no two members of an experimental group will give identical responses to an applied procedure. The knowledge of variation among individuals will govern the selection of subjects with regard to species, age, sex, hereditary background, physical or metabolic type, status of health, intelligence, past history, "family relationship," and individual idiosyncrasies. Most important, the variation will aid in determining the number of subjects that must be selected in order that adequate neutralization or control of the variable characteristics may be secured for the proper evaluation of the results of the experiment. The reason is that in small groups of subjects individual differences may exert a very important effect on the results, whereas in groups of large size these differences tend to cancel out or balance each other, so that the over-all observations will be more evenly distributed between two extremes. The importance of adequate selection and proper control cannot be overemphasized.

Controls[9] • Adequate control subjects must be provided, and, if sampling has been proper, the controls usually will be comparable in all respects with the experimental units at the beginning of the experiment. With human subjects or laboratory animals, every effort should be made to discern and evaluate individual subjects that may exhibit any abnormality during the course of the experiment. Adequate control of the conditions of the experiment can be approached only after careful study of every conceivably pertinent aspect of the environment. In tests with laboratory animals or humans, "experimental conditions" are equivalent to the total environment during the experimental period, and include temperature, diet, activity, uniform use of the test material, the quality and uniformity of the test material, the presence or availability of factors which may possibly interfere with the action of the test material, and other factors which may not be readily apparent. Because the factor of suggestion is so important in studies with the higher animals, "blind" experiments are always preferred and often essential, utilizing placebos for the controls and masking the identity of the subjects and materials from the examining investigator as well as from the subjects themselves. Placebos should be identical with the test preparations except, of course, that the active agent is omitted from the placebo.

The treatment of control groups should correspond in every respect with the treatment of the experimental groups, with the obvious exception that the material being tested should not be available in any quantity or form to the controls.

Number of Subjects • Experiments, either clinical or otherwise, should be designed with the aim of controlling all the conditions as far as it is possible to achieve control, so that the relation of cause to effect may be established clearly. Control, in the experimental sense, comprises two concepts which must be considered together: (1) The investigator, by proper selection and by regulation of the conditions of the experiment, can exert a certain degree of control over his subjects. For example, bacteria may be grown in a completely synthetic medium under delicately regulated conditions of temperature, nutrition, pH and other factors. Even the most delicate thermoregulator, however, will allow the temperature to vary between certain limits. It follows that (2) the investigator should have exact knowledge of the variation in experimental conditions so that he may be in a position to evaluate its possible importance with respect to its influence on the results. In a recent clinical study of dental caries in relation to the use of an ammoniated dentifrice[10] the investigators established a rigorous pattern of supervised toothbrushing at the beginning of the experiment. While the investigation was in progress, however, it was learned that some of the subjects had been consuming fluoride-bearing water. Although the effects of fluoridation in the age group under study might not have influenced their results, the investigators wisely eliminated those subjects before evaluating the data. In this instance, better control of the experiment was achieved even though a large number of subjects had to be dropped from the study.

Where ideal regulation is not possible, the number of subjects should be sufficiently large to compensate for the experimental error; that is, for variations among individuals, for the lack of control over experimental conditions, and for deficiencies or limitations of experimental measuring apparatus and pro-

9. Ross, O. B. Use of controls in medical research. J.A.M.A. 145:72 Jan. 13, 1951.

10. Kerr, D. W., and Kesel, R. G. Two-year caries control study utilizing oral hygiene and an ammoniated dentifrice. J.A.D.A. 42:180 Feb. 1951.

cedural technics. Adequacy of the number of subjects is dependent also on the relation between the magnitude of the experimental error and the magnitude of the expected differences between control and experimental groups at the end of the experiment. Expressed more simply: if the experimental error is great and past experience or preliminary tests show that the observed differences between groups will be relatively small, a large number of subjects will be required for the conduct of future tests. Methods have been described for estimating the least number of subjects that will be needed in order to obtain statistically valid results.[11]

Selection of Subjects • The factor of variation among individuals may be controlled to some extent by proper selection of subjects. Systematic and random sampling procedures should be employed.

By systematic sampling the population should be separated into general categories with respect to the problem, thereby simplifying the design of the experiment. The decision to use school children for a study of dental caries represents a common application of systematic sampling by which the sample is restricted chiefly with respect to age, but to a degree also with respect to environment, certain habits, part of the diet (school lunches), economic status and other factors. By way of further illustration, in a study of the effect of a drug in treating a specified disease, one would select only those subjects that are afflicted with the disease, since little purpose would be served by administering the drug to healthy individuals (the effects of the drug in healthy subjects might give some indication of its safety, but would not contribute to knowledge of its therapeutic usefulness). In certain experiments it may be advisable or even necessary to match experimental and control subjects with respect to age, sex, size, hereditary background and so forth. Littermates or siblings may be chosen and distributed between control and experimental groups in an effort to reduce the variability even further.

It stands to reason, however, that the more the selection of subjects is restricted the narrower will be the field of application of the results. Conclusions drawn from a study of effects in aged males, for example, cannot be expected to pertain with equal validity to a population of infant females or even to the general population.

When systematic selection has determined the class of subjects to be studied, it remains to reckon with individual differences between subjects. In most instances, random sampling will be the most effective method by which to reduce the influence of individual variation. The prime requisite of a good randomizing technic is that each individual has an equal opportunity of being assigned to the control or the experimental group, that is, the subjects are "randomized."

In certain instances, however, such as in comparing different local anesthetics, the control and experimental agents are randomized. In this type of study the same subject may be treated at different sites or at different times with test agents that have been randomized and coded by a disinterested party so that neither the patient, the operator giving the treatment, nor the individual observing the effects is aware of the identity of the material administered. This is a good example of a so-called "blind study."

If a therapeutic agent is intended for use on the general public, the subjects utilized in the study should comprise a good representative sample of the general population. Detailed and lucid discussions of sampling may be found in several works on the subject.[5, 6, 7, 8]

11. Chilton, N. W., and Fertig, J. W. The estimation of sample size in experiments. I. Using comparisons of averages. J. D. Res. 32:530 Aug.; II. Using comparisons of proportions 32:606 Oct. 1953.

Measurements and Estimates • Measurements should be made with the greatest possible accuracy, and should be reproducible with reasonable precision. The fallibility and limited accuracy of measuring devices and technics should be recognized and considered in relation to the significance of the observations. For example, if relative rapidity of healing is observed with a device which can accurately measure the diameter of a lesion to the nearest millimeter, arithmetic averages of several individual readings should not be expressed to greater precision than one millimeter, and may be misleading if expressed to one-tenth or one-hundredth of a millimeter. Similarly, when expressing dental caries experience in terms of DMF (decayed, missing or filled) teeth or surfaces, it should be recognized that small pits occasionally may be counted as carious in one examination and noncarious in another, and that unless its history is known, a tooth lost between examinations represents a possible source of error, since it may have had from zero to five carious surfaces.

Many kinds of measurement involve subjective estimation to such a degree that two different examiners, or even the same examiner at different times, may disagree on the observations. When measurements consist of subjective approximations (such as the extent to which a lesion has improved) performed by a specially trained examiner, the criteria for differentiation between the levels of the examiner's classification scale must be clearly delineated so that other competent individuals may be able to check the measurements and obtain agreement with the examiner's observations.

The importance of the observer's training and competence is frequently underrated, with the result that a carefully devised experiment occasionally may be rendered worthless because of the inadequacy of a well-intended but inexperienced novice (see section on Testimonial Evidence).

Statistical Significance • If the experiment has been designed and carried out in accordance with the foregoing principles, the observations usually will lend themselves to analysis for significance by the statistical methods appropriate for that particular kind of experiment. Statistical analyses of the data should be provided in the report to assist the reader in the evaluation of the results and in the formation of conclusions from them. The statistical method should be shown in detail or identified by reference.

Because of the increasing frequency with which statistical methods are being employed in research, students and other interested individuals have come to realize that there is nothing mysterious about this scientific tool. "Statistics" is common sense expressed mathematically and, if the validity of the mathematical derivations is accepted, an understanding of the basic principles and usefulness of statistics may be grasped in a few hours of interesting reading.[5-8] The prospective investigator, however, should have a profound knowledge of the subject, or he should consult with a competent statistician before and during the study.

In most biological investigations the variation is so great that a simple arithmetic average (mean) may often lead to a completely misleading interpretation of the results for the group. By calculating the standard deviation of the mean, the statistical significance of the mean can be determined. The standard deviation is a measure of the scatter of the observations around their mean.[7] This is important in the comparison of the arithmetic average of two groups. If, for example, the average (mean) age of a group of patients is stated to be 45 years, they might all be between 44 and 46 years old, or their ages might range from 1 to 100 years; the standard deviation

would show how the ages are distributed, for it would be a small value in the first case and a large value in the second.

In general, statistical analysis merely reveals the probability with which the data obtained from the experiment could be obtained by chance if a large number of sample groups were taken at random from the same population or "universe." For example, if groups of four cards are taken at random repeatedly from a huge pile of several thousand playing cards, statistical methods may be employed to show how frequently four aces might be expected to occur together by chance in any one such group. The probability of making such a selection is rather remote. If, however, one applies a special device to this problem and finds that with the device four aces may be drawn on almost every try, the observations are highly significant, and they suggest that the use of the device is in some manner related causally to the difference between the usual result and the result obtained in the experimental procedure.

Similarly, if groups of 50 patients are selected at random repeatedly from a large number of patients, statistical methods may be employed to show what chances exist for selecting a group in which each individual is completely free of periodontal disease. The probability of making such a selection is rather remote. If, however, one administers a new drug to several thousand of these patients and now finds that all individuals in almost any group of 50 will be completely free of the disease, the findings would be highly significant, and would suggest that the drug is in some manner related to the cause of the remarkable difference between the result usually expected and the result obtained in the experimental procedure.

Although effects such as the one in the foregoing imaginary example are not usually encountered, statistical analysis permits judicious evaluation of less spectacular results.

Practical Significance • When the observed differences possess "borderline" significance from the statistician's viewpoint, it remains to determine the practical significance of the findings. If, for example, a safe drug is discovered which apparently effects a cure in only 5 per cent of patients afflicted with a hitherto fatal disease, it may very well have practical significance as a therapeutic agent; there would be little justification for withholding such a drug from an afflicted patient. On the other hand, if a drug is found which appears to reduce slightly the incidence of dental caries in only 5 per cent of individuals taken at random from the general population, its practical significance as a therapeutic agent would be open to question; if the same drug possesses properties that lead to undesirable side-reactions in many cases, or if its cost is unusually high, its practical therapeutic value would become a matter of great doubt.

TESTIMONIAL EVIDENCE

While few dentists believe that the testimony of any number of men of distinction establishes the usefulness or superiority of certain products in other markets, new dental products occasionally have been accepted on nothing more than the unqualified recommendation of a professional confrere or an enthusiastic salesman. A fundamentally worthless preparation or device does not acquire useful properties simply by virtue of its having been used without apparent harm by many individuals over various periods of time.

From the considerations in this paper, it will be seen that so-called "testimonial evidence," of the type that is frequently furnished by clinical specialists who may be unaware of the exacting standards required in scientific testing, is rarely adequate. Usually such testimonials are prepared after observation of too few cases, without satisfactory controls for com-

parison, and with little regard for accurately defined criteria of measurement. The personal bias of the examiner is often outstanding, and the validity of the entire evaluation is dubious. A typical example of a nonobjective endorsement has been cited by Beecher:

"I have used the remedy you sent me in several patients. It is my distinct impression that this is the finest thing ever made for the purpose."—Statement by an Eminent Clinician.[12]

Testimonial evidence is almost never acceptable.

SUMMARY

This paper briefly sets forth certain basic requirements and concepts for conducting sound research in connection with the testing of agents with potential therapeutic usefulness in dentistry. It is intended to serve both as a guide to those who may contemplate active investigations in this field, and as an aid to the critical dentist in evaluating reports of such studies, whether published or presented orally.

12. Beecher, H. K. Clinical impression and clinical investigation. J.A.M.A. 151:44 Jan. 3, 1953.

Some clinical observations regarding the role of the fluid film in the retention of dentures

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A brief examination of the dental literature for the past hundred years reveals that there is no unanimity concerning the actual physical forces responsible for the retention *in situ* of the complete maxillary denture. Adhesion and cohesion of molecules, capillary attraction, the "suction" provided by atmospheric pressure, "interfacial surface tension," the pressure of the atmosphere relative to that of the fluid film—to cite only the most outstanding—are mentioned as contributors in whole or in part to the picture.

The first American writer to speculate at any length on this problem was Warren,[1] who in an 1897 revision of Richardson's *Mechanical Dentistry* stated that two forces are utilized in the retention of dentures: atmospheric pressure and adhesion. The adhesion of solids to liquids, described as an extremely pronounced force, he illustrated by an experiment in which a polished plate is brought down carefully into contact with the surface of a liquid in such a way that adhesion takes place. Wilson[2]

Graduate student, Northwestern University Dental School.

1. Warren, George W., editor. Richardson's A practical treatise on mechanical dentistry, ed. 7. Philadelphia, Blakiston Co., 1897, p. 214-218.

2. Wilson, George H. A manual of dental prosthetics. Philadelphia, Lea & Febiger, 1914, p. 275-3C..

in 1914 concluded that atmospheric pressure was of little actual value in retention unless a vacuum chamber was included in the design of the plate because of the tendency of the layer of fluid between the baseplate and the soft tissues to equalize the pressure without and within.

In 1923 Greve[3] studied this problem by adapting for the purpose a model of the maxilla in soft vulcanite and a denture baseplate with a hook in the palate. A film of saliva was introduced between the two surfaces, and weights were hung on the hook. Later, the process was repeated with the whole enclosed in a vacuum. No measurable difference in retention ensued, so that adhesion was assumed to be of more importance than atmospheric pressure. At about the same time Le Docte[4] contended that the major factor in retention was "la couche capillaire," or, as it would be termed in English, the fluid film, operating through surface tension phenomena. He concluded also after a series of experiments in which a layer of fluid was interposed between a solid surface and an elastic and deformable one that the greater the elasticity, the better was the retention.

Page,[5] in advancing the theories underlying the static school of impression-taking, wrote that since the only actual factor in denture retention is "interfacial surface tension," operating by virtue of a thin film between two objects in close contact, the most desirable state to be attained in the construction of dentures is such a condition of close contact.[5] As a result, he discounted entirely any effects of atmospheric pressure, such as had been reported by Snyder[6] and a group of Navy colleagues in 1945. The latter had apparently proved by means of tests with denture-wearers in a decompression chamber that a 50 per cent loss in retentive power of the dentures results from a 70 per cent reduction in atmospheric pressure.

Östlund,[7] who in 1947 made laboratory studies of retention using an elastomer resin model based on the idea of Greve, proceeded to test baseplates of various constructions and fluid films of various properties. He observed that the less the viscosity and the greater the surface tension of the fluid film, the greater was the retention.

A contemporary analysis of retention in terms of physical principles was made by Stanitz,[8] who used the classic analogy of two glass plates with a film of fluid between them to simplify the picture of the denture seated in the mouth. Through a series of preliminary mathematical equations, he arrived at the following:

$$F = \frac{2\ CA}{a}$$

when F is the force, C the coefficient of surface tension, A the area of the plate and a the thickness of the fluid film. Since the preliminary steps included one in which the atmospheric pressure (Pa) minus the fluid pressure (Pf) was shown as being equal to twice the coefficient of surface tension (C) divided by the thickness (a) of the film $(Pa - Pf) = \frac{2C}{a}$, the part played by the fluid film in retention could apparently be assumed to be dependent on the pressure of the atmosphere on it.

Thus, although speculation has been abundant, the chief fact in the controversy evidently remains to be established; namely, whether the weight of the at-

3. Greve, Karl. Luftdruk und Adhäsion der Befestigung des Zahnersatzes. Deutsche Zahnärztl. Wchnschr. 30:25 Jan. 28, 1927.

4. Le Docte, J. Théorie physique de la rétention des appareils prothétiques du haut et réalization d'une nouvelle méthode rationnelle de prise d'empreinte. Rev. de stomatol. 29:1076 Dec. 1927.

5. Page, H. L. Mucostatics. Chicago, Author, 1946, p. 3.

6. Snyder, F. C., and others. Effect of reduced atmospheric pressure upon the retention of dentures. J.A.D.A. 32:445 April 1945.

7. Östlund, S. L. G. Some principles in the retention of dentures. (Abst.) Northwest. Univ. Bul. 49:11 Nov. 22, 1948.

8. Stanitz, J. D. An analysis of the part played by the fluid film in denture retention. J.A.D.A. 37:160 Aug. 1948.

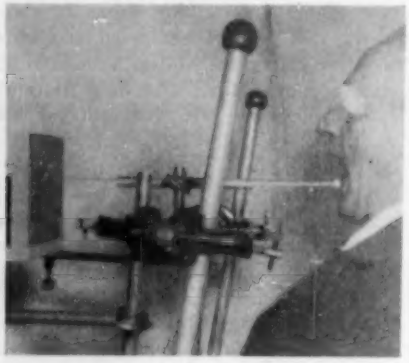

Fig. 1 • Patient with nylon line, hollow rod, pulley and measuring apparatus in place. For photographic purposes, several bars are missing

mosphere or the phenomena related to surface tension and adhesion are mainly responsible for holding maxillary dentures in place. Consequently, it occurred to the writer, in the course of a series of clinical studies on denture retention,[9] that if a way could be found to divorce one set of factors from the other, some light might be shed on the subject. Although Greve, Snyder and others had attempted to nullify the influence of the atmosphere, nevertheless, in every experiment performed the fluid film was present, as far as can be ascertained. When it was demonstrated, therefore, that the fluid film could presumably be eliminated by practical means, a promising approach to the problem became apparent.

MATERIALS AND METHODS

The current work, the purpose of which was to determine the effects on the retention of a maxillary denture of the attempted elimination of the intermediary fluid film layer, was actually the continuation of a series of tests on other aspects of retention. For this study the same patient and clinical procedures were utilized as in the other study. The complete description of the equipment used is reported elsewhere.[9]

In brief, two baseplates were constructed, one by the Schlosser technic, now being employed at the Northwestern University Dental School, a technic in which a zinc oxide eugenol wash impression is used, and the other with an alginate impresison. A number of wire staples were incorporated into the denture base in various positions. These served as eyes into which a hook could be inserted. By means of the mechanism shown in Figure 1, a static load was applied to an eye, perpendicular to the plane of the denture base, for the purpose of dislodging the denture. If the force required to dislodge the baseplate, as measured by a spring dynamometer, was greater than 192 ounces, it was assumed that the retention was complete.

In the search for an effective "drying" procedure, a pharmacological agent, such as atropine sulfate, seemed the obvious means of stopping the formation of the fluid film through suppression of oral secretions. After a fairly lengthy investigation by trial and error, it was discovered that relatively massive doses of this drug, administered orally to the patient after a short period of fasting, were necessary to achieve the desired result. The obliteration of all apparent fluid film was usually brought about after an interval of at least 90 minutes; the absence of the film was the chief criterion, apart from the safety of the patient, for the dosage of the drug. The amount finally established for use in the experiments was 1/50 grain. It is interesting to note that, except for extreme dryness of all the oral tissues, the patient in this experiment evidently experienced a minimum of the familiar reactions, such as dilation of the pupils, paralysis of ocu-

9. Skinner, E. W.; Campbell, R. L., and Chung, P. A clinical study of the forces required to dislodge maxillary denture bases of various designs. J.A.D.A. 47:671 Dec. 1953.

lar accommodation and gastrointestinal symptoms, normally associated with the use of this drug. The *British Pharmacopoeia* lists 1/60 grain as the maximum dose of atropine sulfate. The average dose given clinically is 1/100.[10]

As to further indications of the drying effect of atropine, it was noted that the tissues of the hard palate, soft palate, uvula and buccal sulcus were bone dry to the touch and exhibited a peculiar, iridescent, glazed appearance. A slight suggestion of dampness was evident in the floor of the mouth; however, since deglutition was prohibited during the tests, there was little possibility of transfer of such moisture via the tongue. Furthermore, before each trial, in an attempt to detect any free moisture, the mouth was wiped out thoroughly with a towel and the palate likewise before the plate was positioned. Of apparently great significance was the fact that identical conditions remained at the conclusion of each trial; that is, no free moisture could be detected either on the maxillary surface of the denture or on the tissues in contact with it.

In other words, no fluid film was visible before and during the time the denture was seated. The length of time available for experimentation under the influence of 1/50 grain of atropine sulfate was sufficient to enable all tests to be completed with the dry field.

Table 1 • Effect of the presence or absence of fluid film on the retention of Plate 1

Eye no.	With fluid film	Without fluid film
	oz.	oz.
1	192+	192+
2	34.2	73.6
3	53.0	92.8
4	192+	192+
5	192+	192+
6	48.5	58.8
7	192+	192+
8	192+	192+

Table 2 • Effect of the presence or absence of fluid film on the retention of Plate 2

Eye no.	With fluid film	Without fluid film
	oz.	oz.
1	192+	192+
2	62.4	131.2
3	44.8	102.4
4	192+	192+
5	99.2	192+
6	76.8	150.4
7	192+	192+
8	192+	192+
9	59.2	115.2

DISCUSSION

From the tables (Tables 1 and 2) and graphs (Fig. 2 and 3), the results for the two plates can be noted. In the case of Plate 1, made from the paste-wash impression, a force of 192 ounces on eye no. 1, the median anterior eye, did not dislodge the plate. When the denture base was seated under ordinary conditions, however, the area around eye no. 2, in the second molar region, sustained 34.2 ounces, while, when tested later in the dry environment, it was able to support 73.6 ounces.

In like manner, the area around eye no. 3, also in the molar region, exhibited an increase in retentive force of from 53.0 ounces to 92.8 ounces when tested in the dry mouth. When the dry condition existed, the maximum load on eyes no. 4, 5, 7 or 8 did not dislodge the plate; at the same time, the retention in the midline (eye no. 6) increased from 48.5 ounces under the usual conditions to 58.8 ounces in the dry mouth.

The results for Plate 2, constructed from an alginate impression, seem quite comparable in every way to those obtained with Plate 1. The outstanding fact

10. Dorland, W. A. The American illustrated medical dictionary, ed. 20. Philadelphia, W. B. Saunders Co., 1944, p. 1643.

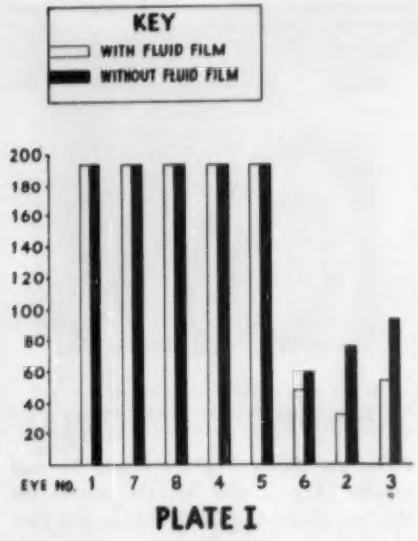

Fig. 2 • Results for Plate 1 in terms of retention in ounces, with and without fluid film

again is that, for those eyes on which the applied force dislodged the plate at all, retention is shown to have been substantially increased under the conditions of the experiment. On the whole, for this plate, the increases are somewhat greater, as for example, the increase in force on eye no. 6 from 76.8 to 150.4 ounces.

The fact that one baseplate was produced according to a static principle of impression-taking and the other by a more orthodox method appears to have had no particular bearing on the results. In fact, the over-all pattern for the two seems more remarkable for its consistency; and the slight variations can probably be attributed to experimental variations, rather than to any significant differences between the technics themselves.

The observation that the apparent absence of a fluid film between the denture and the palate seems to increase the retention of a denture rather than to decrease it cannot be explained readily. Since factors directly dependent on the fluid film, such as "interfacial surface tension" and capillary attraction, are therefore seemingly eliminated as forces in denture retention, any practical theory based on these considerations would seem to require re-evaluation. On the other hand, it may be that retention can be accounted for by some of the other hypotheses, such as adhesion; that is, the attraction of unlike molecules, as mentioned by Warren and Wilson.[1,2]

Although no fluid film could be discerned, there is, of course, the possibility that some type of film was present and remained undetected. In such an event, the film would probably have been extremely thin. If that had been the case, according to the equations of Stanitz,[3] the retentive force would have been greatly increased.

The possible sources of such a film can only be surmised. Little is known concerning the question of tissue secretions. If such secretions do exist in minute amounts, then the possible effect cannot

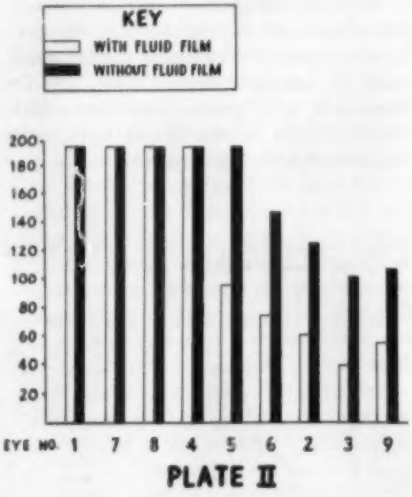

Fig. 3 • Results for Plate 2 in terms of retention in ounces, with and without fluid film

be neglected as a consideration in this connection.

Another consideration, perhaps of greater likelihood, is that a minute water film was formed by the acrylic resin. The denture bases were stored in water at room temperature when not in use. Although the denture base was always carefully dried before insertion, it is conceivable that a syneresis of some nature may have occurred at mouth temperature during the test. Such a situation seems rather improbable, however, since it is a well-known fact that the water-sorption of acrylic resin increases with the temperature and that therefore at body temperature water would be absorbed rather than expelled. At any rate, if any fluid film formed in this manner, it could not be detected by the means at hand during the experiment.

SUMMARY AND CONCLUSIONS

The retention of acrylic resin maxillary denture baseplates was measured clinically with a fluid film and with the mouth surface dry. The following facts were made evident:

1. The absence of the normal layer of fluid between the denture base and the palate did not in any way lessen the retention of the denture.

2. In every case where the denture could be dislodged in a particular area, the amount of force necessary to dislodge it was actually increased by the apparent lack of the fluid film.

3. In this respect, there appeared to be no significant difference in retention between plates made by the static technic and by a so-called pressure technic of impression-taking

4. The increase in retention of a denture base without the usual fluid film cannot be explained on the basis of accepted theories.

The Unknown Nature of Proteins • The empirical manner in which research in the protein field must proceed has long been a thorn in the side of biochemists. Besides requiring untold hours of cut-and-try experimentation, it leaves unanswered the fundamental questions on the nature of proteins.

Without proteins there is no life. Proteins exist only as part of and as products of life. Many agents producing disease owe their destructiveness to the proteins they contain. Yet, the structure of not one single protein is known!

In spite of the immense variety of proteins and their range from beneficial to harmful, they are known to have many common characteristics. For instance, they can all be broken down into a very few chemical substances, all of which are called amino acids; this is evidence that the underlying structure of all protein molecules is similar. There is a great deal of other evidence, all pointing in the same direction. However, the structure—the way atoms are arranged and fastened together—in even one kind of protein molecule is still unknown. If this underlying structure were known in the fundamental molecule of a protein, it would doubtless be possible to explain many of the ways that proteins behave and even to predict new things that proteins could do. *"Science on the March," The Scientific Monthly 77:110 August 1953.*

COUNCIL ON DENTAL THERAPEUTICS

R. B. Waite's Fluoride Polishing Paste classified in group C

R. B. Waite's Fluoride Polishing Paste, manufactured and distributed by Cook-Waite Laboratories, Inc., is promoted to the profession as a cosmetic preparation for polishing the enamel and as a therapeutic agent for applying sodium fluoride during prophylaxis.

A promotional pamphlet (7-52 2091) states that the paste consists of a flavored, water-miscible base containing 2 per cent sodium fluoride, and powdered aluminum hydroxide of ultramicroscopic particle size. The paste is colored blue. Evidence is offered to show that the polishing agent is effective.[1]

For fluoride therapy, the pamphlet recommends that after the teeth are thoroughly cleaned by routine prophylaxis, one quadrant at a time should be dried and blocked off with cotton rolls. All accessible surfaces should be polished with the paste in a rubber cup and a coating of the material should be left in contact for at least four minutes, during which time the contact points should be polished with dental floss. The mouth then should be sprayed thoroughly to remove all traces of the paste. Repetition of the procedure at succeeding visits and at intervals over the years is recommended in accordance with Knutson's schedule.[2]

The booklet presents unpublished evidence purporting to show that fluoride is taken up *in vitro* by powdered enamel when a quantity is mixed with different amounts of the paste and allowed to remain in contact with it for a few minutes.

Additional studies demonstrated by autoradiographic technic that the immersion of a whole tooth in a slurry of the polishing paste containing only 0.1 per cent sodium fluoride, prepared by diluting the paste with three volumes of water containing F^{18}, resulted in the removal of the radioactive isotope from the slurry and its incorporation into the surface of the enamel. From these experimental findings it is implied that the clinical use of the paste in the manner described will result in reduction of dental caries in children.

The possible irrelevance of these experimental findings to the actual clinical value of the product is indicated by consideration of other reports. For example, Phillips and Muhler[3] and Bibby[4] showed that powdered enamel was more resistant to dissolution after exposure to acid solutions than to similar solutions at neutral pH; but Rickles and Becks[5] demonstrated

1. Alford, C. E., and others. Polishing power of dentifrices, quantitative studies. J.A.D.A. 36:270 March 1948.

2. Knutson, J. W. Sodium fluoride solutions; technic for application. J.A.D.A. 36:37 Jan. 1948.

3. Phillips, R. W., and Muhler, J. C. Solubility of enamel as affected by fluorides of varying pH. J. D. Res. 26:109 April 1947.

4. Bibby, B. G. Use of fluorine in prevention of dental caries. III. A consideration of the effectiveness of various fluoride mixtures. J.A.D.A. 34:26 Jan. 1947.

5. Rickles, N. H., and Becks, Hermann. The effects of an acid and a neutral solution of sodium fluoride on the incidence of dental caries in young adults. J. D. Res. 30:757 Dec. 1951.

that topical application of acidic fluoride solution to the teeth of young adults did not reduce caries incidence although a neutral solution was effective. Although in recent tests[6] the reliability of the methods employed in the solubility studies has been questioned, the foregoing citations serve to emphasize that extreme caution should be observed in attempting to transfer laboratory findings to clinical application.

The Council believes that the *in vitro* findings in this instance cannot be accepted as proof of therapeutic usefulness, in view of the obscurity of the actual mechanism whereby caries reductions are achieved with topical fluoride solutions.

The Council is not aware of clinical evidence that R. B. Waite's Fluoride Polishing Paste, used according to the manufacturer's directions, will accomplish a caries reduction comparable to that shown for a 1 to 2 per cent solution of sodium fluoride. Such proof must await the results of controlled clinical studies before the therapeutic value of this product can be judged.

Therefore, the Council on Dental Therapeutics has voted to classify R. B. Waite's Fluoride Polishing Paste in Group C. The Council will review the material at any time that new evidence is available.

6. Muhler, J. C., and Day, H. G. Relation of pH to the effectiveness of sodium fluoride and stannous fluoride in decreasing enamel solubility. J. D. Res. 31:102 Feb. 1952.

Topical application of fluoride for caries reduction

The current technic for applying fluoride solution to children's teeth has been recommended to dental practitioners, largely as a result of the controlled studies of Knutson and his associates,[1-3] which followed the early investigations of Bibby.[4-6] Under the conditions and methods which Knutson developed, the procedure has resulted in a significant reduction in dental caries incidence among the groups that were studied.

No comparable studies have been reported indicating that equally good results might be obtained if the technic or therapeutic agent used by Knutson and co-workers were modified.

From available evidence[1-9] it appears that:

1. The surface of the teeth first should be cleaned.

2. The concentration of the therapeutic material applied should provide at least as much available fluoride ion as is supplied by a 1 to 2 per cent aqueous solution of sodium fluoride.

1. Knutson, J. W. Sodium fluoride solutions: technic for application. J.A.D.A. 36:37 Jan. 1948.

2. Knutson, J. W., and Armstrong, W. D. Value of topically applied sodium fluoride in the control of dental caries. Public Health Rep. 58:1701 Nov. 19, 1943; 60:1085 Sept. 14, 1945; 61:1683 Nov. 22, 1946; 62:425 Mar. 21, 1947; 63:1215 Sept. 17, 1948.

3. Knutson, J. W. Topical fluorides in today's dental caries prevention program. Penn. D. J. 18:129 May 1951.

4. Bibby, B. G. Preliminary report on the use of sodium fluoride applications in caries prophylaxis. J. D. Res. 21:314 June 1942.

5. Bibby, B. G. A new approach to caries prophylaxis. A preliminary report on the use of fluoride applications. Tufts D. Outlook 15:4, 1942.

6. Bibby, B. G. The effect of sodium fluoride applications on dental caries. J. D. Res. 22:207 June 1943.

7. Gelagan, Donald J., and Knutson, J. W. Effect of topically applied fluoride on dental caries experience. VI. Experiments with sodium fluoride, calcium chloride, widely spaced applications, use of different solution concentrations. Public Health Rep. 63:1215 Sept. 17, 1948.

8. Jordan, W. A., and others. Effects of various numbers of topical applications of sodium fluoride. J.A.D.A. 33:1385 Nov. 1946.

9. Adler, P.; Straub, J., and Popuvics, M. Intravital uptake of fluoride by the teeth under various conditions. J. D. Res. 29:549 Aug. 1950.

3. The number of applications recommended should provide a minimum caries reduction comparable to that already shown to follow four four-minute applications of a 1 to 2 per cent solution of sodium fluoride.

In view of the lack of information on the effect of modifying the foregoing points, the Council believes that it is presently justified only in recommending a simple 1 to 2 per cent solution of sodium fluoride for use in this procedure.

The Council has no desire to prescribe or delimit the present technic or materials used in topical application. It is aware of the shortcomings of the application of an essentially "group" method to private practice. The Council welcomes sound research which may discover methods or materials better adapted to private dental practice procedures, and is presently providing some financial support to such studies.

Council announces classification of additional products

The classification of products by the Council on Dental Therapeutics has been described in a previous report (J.A.D.A. 40:489 April 1950). The Council's program now provides for classification of products in Group A, Group B, Group C and Group D. Products are reconsidered periodically, and decisions are subject to change at any time that a substantial amount of new evidence becomes available. The files of the Council contain information on many drugs and dental cosmetics, and inquiries are welcome.

GROUP A

Listing of products in Group A means that at the time of their consideration, the items conformed with the provisions for acceptance established by the Council on Dental Therapeutics and adopted by the Board of Trustees and the House of Delegates of the American Dental Association. Items in this group will be listed in *Accepted Dental Remedies* and may use the Seal of Acceptance, unless otherwise provided.

The following additional products are classified in Group A:

Crystalline Terramycin Pediatric Drops (Chas. Pfizer & Co.): A solid mixture containing 1 Gm. of oxytetracycline (base) to which may be added 7.2 cc. of water in order to produce approximately 10 ml. of colored and flavored suspension containing 100 mg. of oxytetracycline per cubic centimeter. See *A.D.R.* ed. 19, p. 61.

Hyacide Concentrated Germicidal Solution (E. R. Powells): A solution for the disinfection of dental instruments, stated to contain benzethonium chloride, 12.8 per cent; water, 87.2 per cent; with or without certified color. This is a concentrated dosage form, intended for dilution with water to produce a 1:1,000 solution of benzethonium chloride. See *A.D.R.*, ed. 19, p. 86.

GROUP B

Listing of products in Group B means that there is insufficient evidence to justify their present acceptance, but there is reasonable evidence of their usefulness and safety. These products meet the other qualifications and standards established by the Council on Dental

Therapeutics and the Division of Chemistry. It is the Council's opinion that Group B products may be promoted for special use and study.

GROUP C

Listing of products in Group C means that the evidence is so limited or inconclusive that the products cannot be accurately evaluated. It is the Council's opinion that Group C products require further study by qualified investigators.

The following additional product is classified in Group C:

R. B. Waite's Fluoride Polishing Paste (Cook-Waite Laboratories, Inc.): See page 64 for complete report.

GROUP D

Listing of products in Group D means that they are unacceptable because of their demonstrated inability to meet the standards outlined in the provisions for acceptance.

BUREAU OF LIBRARY AND INDEXING SERVICE

The American Dental Association Film Library

The following films on exodontics have been added to the American Dental Association Film Library and are now available at a nominal rental fee of $2.50 to dental societies, study clubs, dental schools, hospital dental staffs and the armed services dental personnel. Since the number of prints of each title is necessarily limited, it is suggested that program chairmen plan their programs far enough in advance to insure availability.

FILM REVIEWS

Removal of Impacted Third Molar • 16 mm., color, sound, 20 minutes. Produced in 1951 by S. Daniel Seldin, D.D.S.; Harry M. Seldin, D.D.S., and William Rakower, D.D.S. Procurable on loan ($2.50) from the American Dental Association Film Library, 222 E. Superior St., Chicago, or on purchase from the producers, 57 W. 57 St., New York.

This film illustrates technics for the removal of impacted teeth, particularly impacted third molars. Preoperative roentgenograms, models and animated drawings of an impacted third molar are studied, and the technics for removal are discussed prior to the demonstration on a patient. The latter part of the film shows various methods for removal of impacted teeth. In one method, for example, the neck of the tooth is removed before the roots; in another, the overlying bone is removed with chisel and hand mallet.

This film is well organized. It is excellent for teaching purposes. The photography is good. It is suitable for general practitioners, dental students and hospital dental staffs.

Use of Elevators for Removal of Roots and Teeth • 16 mm., color, sound, 20 minutes. Produced in 1951 by S. Daniel Seldin, D.D.S.; Harry M. Seldin, D.D.S., and William Rakower, D.D.S. Procurable on loan ($2.50) from the American Dental Association Film Library, 222 E. Superior St., Chicago, or on purchase from the producers, 57 W. 57 St., New York.

This film shows the various types of elevators that can be used for the extraction of lower left and right molars. Two of these elevators differ from the conventional type in that one has a blade which is at right angles to the shank of the cylinder and the other can be used as a hand chisel. Their use is demonstrated first on models and then on a patient.

This film is well organized and well presented. It opens with an outline of the content and concludes with a summary. It is short enough so that it may be integrated into a dental course on exodontics. The photography is good and enables the viewer to see the demonstrations clearly. It is suitable for use by general practitioners, dental students and hospital dental staffs.

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

The 1953 survey of dental practice
II. Income of dentists by location, age and other factors

The mean net income in 1952 of the 4,345 dentists who answered the income question was $10,539. The mean net income for independent (nonsalaried) dentists was $10,873, compared to $6,920 for salaried dentists. Medians were $9,502 for all dentists, $9,961 for independent dentists, and $6,525 for salaried dentists.

(The mean is obtained by adding the incomes and dividing by the number of incomes added; it is popularly called the average. The median is obtained by ranking the incomes from lowest to highest and taking the income above which and below which half of the incomes fall.)

Part-salaried dentists reported a mean net income of $9,918. This group may be divided into those whose income was mainly from independent practice, with a mean of $10,953, and those whose income was mainly from salary, with a mean of $6,603.

The distribution of dentists according to net income level is shown in Table 4. All dentists who reported a figure for net income were included, whether or not they worked the full year. Net income, as defined in this survey, includes all income from dental work, before income taxes.

Dentists who indicated they were members of the American Dental Association in 1952 reported a mean net income of $10,837, compared to $6,611 for nonmembers. The respective medians were $9,881 and $5,325. The mean net income of the 33 women dentists who participated in the survey was $7,042.

Among independent dentists, the solo practitioner reported a mean net income of $10,724 (Table 5). This compares with $11,039 for the dentist who shared part of the costs of his practice in some type of cooperative arrangement, and $14,876 for the dentist who practiced as a member of a complete partnership. The ratio of net to gross income was practically equal for the three types of independent practice.

The mean net income of dentists employed by other dentists was $7,215. This did not differ significantly from the means for two other groups of salaried dentists, those on staffs of dental schools ($7,550) and "other" salaried dentists ($7,227).

A total of 12.2 per cent of the respondents indicated they had received income from more than one type of dental employment or practice organization. Most of the dentists in this category were primarily independent dentists who received additional income as salary. Of all respondents, 90.8 per cent received most of their income from independent practice, the remainder receiving the larger part of their income from salary.

Dentists who received all of their 1952 dental income from the Armed Forces comprised less than 1 per cent of the sample, whereas approximately 8 per cent of all active dentists are in the Armed Forces. These dentists reported a mean income of $5,241 in 1952. The mailing list used in this survey excluded dentists known to be in the Armed Forces; the 0.9 per cent who reported being in the Armed Forces in 1952 were

The introductory article of this series appeared in the Journal, December 1953, p. 685.

mainly dentists who had been released from the Armed Forces since 1952 plus a small number currently in service remaining on the mailing list through error.

Income of dentists varied considerably according to region and state, as shown in Table 6. The Far West led all other regions, with a mean net income of $12,867, followed in order by the Southeast ($11,526), the Southwest ($11,019), Central ($10,028), New England ($9,842) and the Middle East ($9,707). That the differences between some of these means are not significant is apparent from the standard errors as shown in Table 6.

The ranking of regions according to mean net income of independent dentists is the same as that for all dentists. However, the line-up of regions with respect to gross income of independent dentists differs slightly from that of net income. The Central region, which ranks fifth in net income, ranks seventh (last) in gross income. The ratio of mean net to mean gross income is higher in the Central states (60.8) than in any other region. The Central region is the one region in which all states submitted enough returns to justify calculation of averages, and every one of these states showed a high ratio of net to gross income (low expense ratio).

Separate averages are presented for the 28 states that submitted at least 40 returns. Of these 28 states, mean net incomes of over $12,000 were reported by dentists in California ($13,243), Florida ($12,790), Georgia ($12,572), Kansas ($12,525), Tennessee ($12,404) and Washington ($12,342). Mean net incomes of less than $9,000 were reported by Iowa ($8,997), Pennsylvania ($8,746), Wisconsin ($8,595) and Nebraska ($8,558). It is entirely possible, of course, that some of the states with too few returns to allow computation of averages actually had higher or lower incomes than the states cited.

The median, being that amount which is exceeded by half of the dentists, is not influenced greatly by the few unusually high incomes as is the mean. For this reason, the median is often preferred to the mean in typifying a group with respect to income. Nine out of every 10 dentists are primarily independent. Thus, the median income of independent dentists has certain advantages in describing the "typical" dentist.

When regions are ranked according to median net income of independent dentists, the Northwest drops from fourth to sixth and the Central states and New England each advance one place to fourth and fifth, respectively. Ranking individual states on the same basis, Georgia and Kansas drop out of the "top six" as listed above and are replaced by Oregon and Virginia.

Table 4 • Percentage distribution of dentists by 1952 net income level, according to type of employment

Net income level	All dentists	Independent dentists	Part-salaried dentists	Salaried dentists
Loss: $1–$1,000	0.2	0.2	0.0	0.0
$1–$949	0.9	0.6	1.3	3.3
$950–$1,949	2.1	1.9	2.4	4.4
$1,950–$2,949	3.2	2.8	2.7	7.3
$2,950–$3,949	4.0	3.9	4.3	4.7
$3,950–$4,949	4.9	4.5	6.4	6.9
$4,950–$5,949	6.9	6.2	9.6	12.3
$5,950–$6,949	7.6	7.0	8.5	14.5
$6,950–$7,949	7.7	7.4	8.8	11.6
$7,950–$8,949	8.4	8.4	8.6	8.7
$8,950–$9,949	6.5	6.7	5.9	6.5
$9,950–$10,949	7.4	7.5	7.8	5.5
$10,950–$11,949	5.8	5.8	7.5	4.7
$11,950–$12,949	5.8	5.9	5.6	4.4
$12,950–$13,949	4.9	5.3	4.3	1.1
$13,950–$14,949	3.7	4.2	0.5	1.5
$14,950–$15,949	4.1	4.5	3.5	0.4
$15,950–$16,949	3.2	3.5	1.6	0.7
$16,950–$17,949	2.1	2.4	0.3	0.0
$17,950–$18,949	2.0	2.2	1.6	0.4
$18,950–$19,949	1.3	1.3	2.1	0.0
$19,950–$24,949	4.5	4.8	4.0	1.1
$24,950–$29,949	1.4	1.5	1.9	0.0
$29,950 and up	1.4	1.5	0.8	0.0
Total	100.0	100.0	100.0	100.0

As shown in Table 7 and Figure 2, independent dentists in cities of 100,000 to 250,000 and 250,000 to 500,000 population had higher incomes than dentists in cities of larger or smaller size. Dentists in the smallest places reported the lowest incomes. Dentists in cities of over a million population had mean net incomes about 5 per cent under the national mean, but their median incomes were more than 11 per cent below the national median. Inspection of the figures for particular cities reveals that the three largest cities, New York, Chicago and Philadelphia, reported incomes much below Los Angeles and Detroit. The mean net income of independent dentists in the three largest cities was only $9,417, compared to $13,178 in the other two cities of over a million population.

There was a greater difference between means and medians in large than in small cities. This results from the fact that most of the relatively few very large incomes were earned by dentists in the largest cities.

The analysis of dentists' income according to age is presented in Table 8 and Figure 3. This indicates that dentists generally reach the peak of their earning power between the ages of 40 and 44. The decline after this age level is very gradual through the middle fifties; thereafter it is more pronounced. Undoubtedly a sizable number of the dentists in the youngest and oldest age groups did not work the full year. The decrease in income of salaried dentists at upper age levels was slight compared to that of independent dentists.

The ratio of net to gross income of independent dentists increased gradually with age until age 75. Dentists 75 and older, many of whom worked short hours,

Table 5 • Average net income of dentists according to type of practice organization or employment, 1952

Type of employment	Per cent of respondents	Mean net income	Median net income	Standard deviation*	Coefficient of variation†	Standard error of the mean‡
Independent practice without partners and with no sharing of costs	74.3	$10,724	$ 9,817	$6,007	56.0	$104
Independent practice without partners, but sharing costs of offices or assistants, etc.	6.6	11,039	10,550	5,853	53.0	346
Independent practice as a partner in a complete partnership	1.6	14,876	13,000	7,207	48.4	861
Employed by another dentist	1.7	7,215	6,867	5,149	71.4	606
In Armed Forces	0.9	5,241	5,978	1,741	33.2	275
On staff of dental school	0.8	7,550	7,017	2,788	36.9	486
Other position as salaried dentist	1.9	7,227	7,100	3,196	44.2	355
Combinations of above types of employment	12.2	10,102	8,775	7,925	78.4	344
All types of employment	100.0	10,539	6,920	6,550	62.2	99

*The standard deviation is a measure of absolute variability. It is calculated by summing the squares of the deviations of the individual replies from the mean, dividing by the number of replies and extracting the square root of the quotient thus obtained.

†The coefficient of variation is a measure of relative variability. It is calculated by dividing the standard deviation by the mean and multiplying by 100.

‡The standard error of the mean is a measure of sampling error. It is calculated by dividing the standard deviation by the square root of the number of replies minus one. The chances are 68 out of 100 that the true mean lies within the range of the sample mean plus or minus one standard error, assuming the sample is not biased.

Table 6 • Average income of dentists by region and state, 1952

Region and state	All dentists (net income)					Independent dentists				Salaried dentists	
	Mean net income	Median net income	Standard deviation	Coefficient of variation	Standard error of the mean	Mean net income	Median net income	Mean gross income	Mean net as per cent of mean gross	Mean net income	Median net income
NEW ENGLAND	$ 9,842	$8,800	$6,023	61.2	$397	$10,201	$9,033	$18,412	55.4	*	*
Connecticut	10,979	10,033	6,137	55.9	733	11,153	10,100	20,227	55.1	*	*
Maine	*	*	*	*	*	*	*	*	*	*	*
Massachusetts	9,862	8,900	6,320	64.1	623	10,348	9,350	18,683	55.4	*	*
New Hampshire	*	*	*	*	*	*	*	*	*	*	*
Rhode Island	*	*	*	*	*	*	*	*	*	*	*
Vermont	*	*	*	*	*	*	*	*	*	*	*
MIDDLE EAST	9,707	8,500	7,007	72.2	208	9,892	8,738	16,958	58.3	$7,663	$7,175
Delaware	*	*	*	*	*	*	*	*	*	*	*
D. C.	*	*	*	*	*	*	*	*	*	*	*
Maryland	*	*	*	*	*	*	*	*	*	*	*
New Jersey	10,412	9,800	8,548	82.1	680	11,008	10,100	18,384	59.9	*	*
New York	9,341	8,150	6,671	71.4	271	9,395	8,362	16,776	56.0	*	*
Pennsylvania	8,746	8,044	4,825	55.1	300	8,668	7,993	14,118	61.4	*	*
West Virginia	*	*	*	*	*	*	*	*	*	*	*
SOUTHEAST	11,526	10,300	6,373	55.3	240	11,840	10,986	21,009	56.4	7,160	7,017
Alabama	11,698	10,200	6,153	52.6	974	*	*	*	*	*	*
Arkansas	*	*	*	*	*	*	*	*	*	*	*
Florida	12,790	11,950	6,643	51.9	811	13,517	12,950	25,725	52.5	*	*
Georgia	12,572	11,850	6,920	55.0	1,031	*	*	*	*	*	*
Kentucky	10,543	8,350	7,654	72.6	1,041	10,823	8,350	18,548	58.4	*	*
Louisiana	*	*	*	*	*	*	*	*	*	*	*
Mississippi	*	*	*	*	*	*	*	*	*	*	*
North Carolina	11,364	9,800	6,554	57.7	999	11,553	9,800	19,053	60.6	*	*
South Carolina	*	*	*	*	*	*	*	*	*	*	*
Tennessee	12,404	11,100	6,213	50.1	888	12,274	11,150	20,655	59.4	*	*
Virginia	11,138	10,000	5,841	52.4	684	11,522	10,800	19,480	59.1	*	*
SOUTHWEST	11,019	10,000	6,169	56.0	464	11,317	10,225	20,524	55.1	*	*
Arizona	*	*	*	*	*	*	*	*	*	*	*
New Mexico	*	*	*	*	*	*	*	*	*	*	*
Oklahoma	10,498	8,750	5,372	51.2	861	10,708	9,000	18,185	58.9	*	*
Texas	10,957	9,990	6,588	60.1	631	11,365	10,350	21,063	54.0	*	*
CENTRAL	10,028	9,300	5,781	57.6	159	10,263	9,500	16,873	60.8	6,749	6,550
Illinois	10,209	9,367	6,023	59.0	341	10,355	9,750	16,978	61.0	*	*
Indiana	9,747	9,400	5,415	55.6	550	10,276	9,967	17,369	59.2	*	*
Iowa	8,997	8,400	4,972	55.3	536	9,061	8,500	14,723	61.5	*	*
Michigan	10,967	10,050	5,809	53.0	400	11,467	10,300	19,488	58.8	*	*
Minnesota	9,322	9,000	4,496	48.2	380	9,401	9,300	15,033	62.5	*	*
Missouri	9,409	8,600	5,339	56.7	521	9,414	8,550	15,461	60.9	*	*
Ohio	11,021	10,075	6,881	62.4	460	11,382	10,500	18,454	61.7	*	*
Wisconsin	8,595	8,267	4,757	55.3	408	8,540	8,200	13,964	61.2	*	*
NORTHWEST	10,611	9,000	6,727	63.4	411	10,739	9,016	19,023	56.5	*	*
Colorado	10,743	8,600	6,576	61.2	930	11,614	9,600	20,727	56.0	*	*
Idaho	*	*	*	*	*	*	*	*	*	*	*
Kansas	12,525	10,983	9,820	78.4	1,279	12,604	*	*	*	*	*
Montana	*	*	*	*	*	*	*	*	*	*	*
Nebraska	8,558	8,000	4,505	52.6	657	7,658	7,583	14,220	53.9	*	*
North Dakota	*	*	*	*	*	*	*	*	*	*	*
South Dakota	*	*	*	*	*	*	*	*	*	*	*
Utah	*	*	*	*	*	*	*	*	*	*	*
Wyoming	*	*	*	*	*	*	*	*	*	*	*
FAR WEST	12,867	12,200	6,952	54.0	272	13,232	12,650	23,768	55.7	7,489	7,000
California	13,243	12,383	7,173	58.2	326	13,514	12,960	24,673	54.8	*	*
Nevada	*	*	*	*	*	*	*	*	*	*	*
Oregon	11,093	9,500	6,560	59.1	763	11,996	11,700	20,880	57.5	*	*
Washington	12,342	11,350	5,843	47.3	626	12,501	12,350	20,735	60.3	*	*
ARMED FORCES	5,241	5,978	1,741	33.2	275	–	–	–	–	5,241	5,978
United States	$10,539	$9,502	$6,550	62.2	$ 99	$10,873	$9,961	$18,797	57.8	$6,920	$6,525

*Too few replies for reliable statistics.

Table 7 • Average net income of independent dentists by size of city and for six large cities, 1952

City size or city	Per cent of respondents	Mean net income	Median net income
Under 1,000	2.0	$7,637	$7,000
1,000–2,500	6.5	8,504	8,050
2,500–5,000	6.9	9,563	9,017
5,000–10,000	8.5	9,954	9,700
10,000–25,000	11.9	10,821	9,975
25,000–50,000	9.5	11,237	10,257
50,000–100,000	9.2	11,441	11,031
100,000–250,000	9.4	12,365	11,675
250,000–500,000	8.5	12,418	11,150
500,000–1,000,000	9.9	12,050	10,750
Over 1,000,000	17.7	10,301	8,816
All cities	100.0	10,873	9,961
New York	8.4	9,290	7,971
Chicago	2.9	10,074	8,250
Philadelphia	1.6	8,874	7,100
Los Angeles	2.8	13,702	12,475
Detroit	1.9	12,412	11,500
Cleveland	1.5	11,594	10,500

reported the highest expense ratio of all the age groups.

Net income for independent dentists according to year of graduation is shown in Table 9. The purpose of this tabulation is to present a more detailed picture of earning trends after graduation than can be seen from the correlation of income with age. None of the 1952 graduates worked the full year. Perhaps the most noteworthy aspect of these figures is the rapidity with which graduating dentists develop their practices and bring their incomes up to and above the over-all average for independent dentists.

Table 9 • Average net income in 1952 of independent dentists who graduated after 1939, by years of graduation

Year of graduation	Mean net income	Median net income
1952	$2,652	$2,033
1951	8,751	7,983
1950	10,036	9,950
1948–49	10,268	9,972
1946–47	11,437	10,000
1944–45	11,547	10,800
1942–43	11,984	11,038
1940–41	12,058	11,700

The net income in 1952 of dentists included in this survey was approximately 50 per cent higher than the net income of dentists in 1948 according to the latest large-scale survey conducted by the U. S. Department of Commerce. It is a well known fact that incomes and prices in general have risen substantially since 1948 and especially since 1950. It is extremely doubtful, however, that incomes of dentists have actually risen 50 per cent during this period. Approximately 18 per cent of the questionnaires mailed in the present survey were returned, com-

Table 8 • Average income of dentists by age, 1952

Age	All dentists		Independent dentists				Salaried dentists	
	Mean net income	Median net income	Mean net income	Mean gross income	Net as % of gross	Median net income	Mean net income	Median net income
25–29	$ 6,791	$ 5,979	$ 7,819	$14,041	55.7	$ 7,030	$4,897	$5,000
30–34	10,159	9,370	10,759	19,020	56.6	9,997	6,524	6,483
35–39	11,837	10,662	12,335	21,393	57.7	11,362	8,014	8,075
40–44	12,473	11,338	12,470	21,663	57.6	11,525		
45–49	12,032	10,750	12,066	20,639	58.5	10,750	8,933	8,500
50–54	11,496	10,500	11,548	19,780	58.4	10,488		
55–59	9,915	8,458	9,999	17,390	57.5	8,475	8,750	8,000
60–64	8,944	7,875	8,982	15,157	59.3	7,900		
65–69	7,328	5,700	7,192	12,142	59.2	5,550	*	*
70–74	5,940	4,300	5,842	8,863	65.9	4,275	*	*
75–	3,628	2,975	3,625	7,079	51.2	3,075	*	*
All ages	10,539	9,502	10,873	18,797	57.8	9,961	6,920	6,525

*Too few replies for reliable statistics.

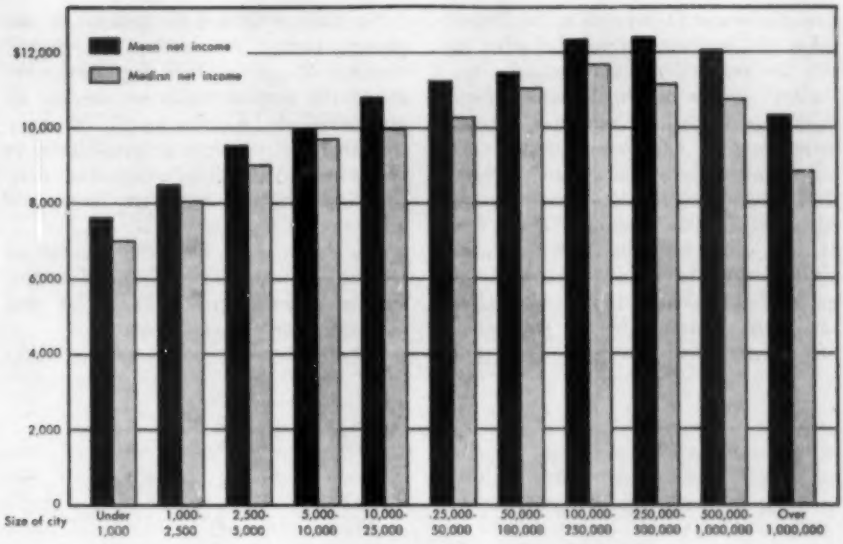

Fig. 2 • Average net income of independent dentists by size of city, 1952

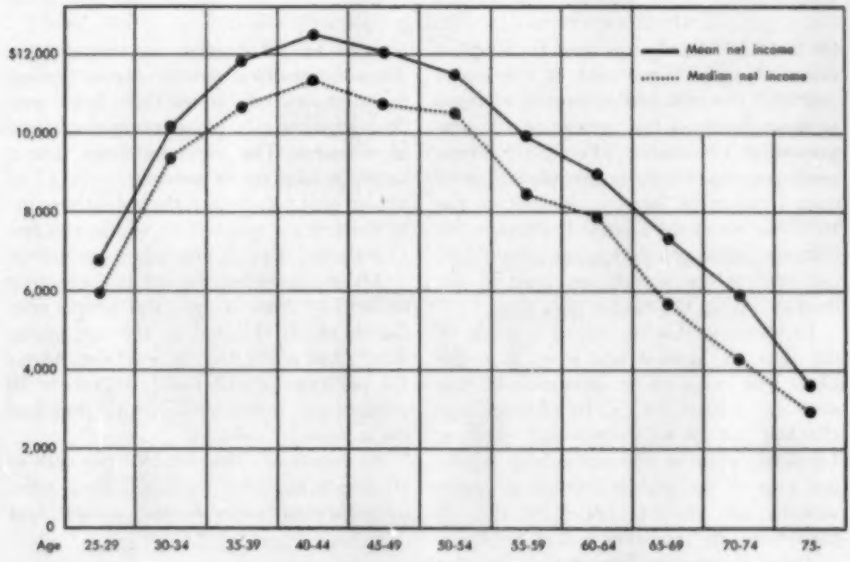

Fig. 3 • Average net income of all dentists by age, 1952

pared to about 11 per cent in the Department of Commerce survey. In either survey the respondents may actually be a "select" group in some respects rather than a perfectly representative group as were dentists to whom questionnaires were mailed. It appears that the group that responded to the current survey, sponsored by the American Dental Association, was a somewhat different group with respect to income than was the group that responded to the survey covering 1948, sponsored by the Department of Commerce.

To have weighted the returns in the present survey to account for underresponse of nonmembers would have reduced the over-all mean net income by approximately 5 per cent. To have weighted the responses geographically to conform with the distribution of all dentists would have changed the mean only a fraction of 1 per cent.

The analysis of The 1953 Survey of Dental Practice will be continued in subsequent issues of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION.

B. Duane Moen, Director

Family dental survey
II. Frequency of visits to the dentist; the annual dental bill

Of the 8,320 family members included in this survey, 55.1 per cent of the males and 60.9 per cent of the females claimed to have been to the dentist within the preceding 12 months (Table 9). These percentages are high in comparison with data from other sources. Results of the 1950 Survey of the Dental Profession, for instance, indicated that approximately 40 per cent of the population went to the dentist during the course of a year.

In most families no record is made of the time the dentist was seen. It seems likely that some of the persons who last saw the dentist 14 or 16 months ago checked the "6 to 12 months" column. Likewise, some of the individuals whose last visit to the dentist was six or seven months ago probably checked the "5 months or less" column, and so forth.

Table 9 indicates how males, females and the various age groups compare with respect to attendance at the dentist. These figures bear out the earlier finding that females, on the average, have seen their dentists at a more recent date than have males. The table indicates that a larger percentage of persons in the 15 to 19 age group have seen their dentist within the last six months, or within the last 12 months, than of any other age group.

About three-fourths of all children under five years of age, and nearly one-fourth of all children in the age group 5 to 9, had never been to a dentist. About 1.4 per cent of the family members 20 years of age and older indicated they had never been to a dentist.

As shown in Table 10, 59.1 per cent of all family members indicated their usual frequency of visits to the dentist was

The first article on this survey appeared in The Journal, November 1953, p. 575.

Table 9 • Percentage distribution of family members by length of time since last visit to a dentist, according to age and sex

	5 months or less		6-12 months		13-24 months		25-36 months		More than 3 years		Never been to a dentist		Total	
Age	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
-4	15.9	15.9	7.8	9.4	0.7	1.5	.0	.0	.0	.0	75.6	73.2	100.0	100.0
5-9	37.0	37.1	29.2	30.9	6.8	7.5	2.3	1.9	0.4	1.3	24.3	21.3	100.0	100.0
10-14	33.3	40.7	36.5	35.4	10.6	10.6	2.0	2.5	5.8	3.3	11.8	7.5	100.0	100.0
15-19	45.2	42.6	34.1	38.0	8.3	5.9	3.2	4.6	3.2	5.1	6.0	3.8	100.0	100.0
20-29	30.6	38.9	33.7	33.8	18.1	13.5	6.4	5.7	9.7	6.3	1.5	1.8	100.0	100.0
30-39	31.1	37.7	28.4	28.8	18.2	14.7	6.2	4.8	14.8	13.2	1.3	0.8	100.0	100.0
40-49	25.5	31.2	28.5	31.0	13.8	11.7	7.9	6.6	21.7	19.1	2.6	0.4	100.0	100.0
50-59	18.8	33.2	27.6	24.8	12.9	11.3	8.2	5.4	32.2	24.8	0.3	0.5	100.0	100.0
60-69	18.9	25.5	22.3	22.3	10.6	11.3	9.5	8.0	36.4	31.7	2.3	1.2	100.0	100.0
70-	18.2	19.8	16.1	19.8	15.4	6.2	7.0	6.2	39.1	46.3	4.2	1.7	100.0	100.0
All ages	28.1	33.1	27.0	27.8	11.6	10.1	5.1	4.5	13.9	13.0	14.3	11.5	100.0	100.0

every 3 or 6 months or every year. Again, this appears to be an overstatement. There was no answer to this question for about 30 per cent of the family members. These have been removed for purpose of computing percentages. It is probable, however, that a large proportion of this group failed to see the dentist with recommended frequency and were reluctant to record this fact.

There was a significant difference in frequency of visits to the dentist according to income. Where the family income was over $5,000, 80.9 per cent of family members went to the dentist at regular time intervals, as compared to 51.1 per cent among the "under $2,000" income group. Those who saw the dentist on an irregular basis (when decay was first noticed, when teeth became painful, or when money became available) amounted to 43.0 per cent in the lowest income group as compared to only 16.8 per cent in the highest income group.

A study was made of the correlation between usual frequency of visits to the dentist and distance from the dentist's office. In most respects the findings were negative. There was some indication, however, of a relationship between distance from the dentist and whether he was seen every six months or every year. Of all individuals who reported living less than five miles from their den-

Table 10 • Percentage distribution of family members by usual frequency of visits to the dentist, according to family income

Usual frequency of visits to the dentist	Family income				
	Under $2,000	$2,000-$3,000	$3,001-$5,000	Over $5,000	All incomes
Every 3 months	4.3	3.1	4.5	6.6	4.6
Every 6 months	21.9	27.1	31.6	44.1	31.1
Every year	21.8	21.9	23.6	26.4	23.4
Every 1½ or 2 years	3.1	4.6	4.1	3.8	3.9
When decay is first noticed	14.4	16.1	14.7	8.1	13.5
When teeth become painful	20.6	14.6	12.0	7.4	13.6
When money becomes available for this purpose	8.0	7.8	5.3	1.3	5.6
Other	5.9	4.8	4.2	2.3	4.3
Total	100.0	100.0	100.0	100.0	100.0

Table 11 • Percentage distribution of family members by number of miles from dentist's office

No. of miles	Per cent
Less than 1	25.8
1-4	34.4
5-9	18.8
10-14	8.9
15-19	4.5
20-29	3.9
30-49	1.7
50 and over	2.0
Total	100.0

tist, 34.1 per cent reported seeing him every six months and 23.4 per cent every year. The analogous figures for individuals 20 miles or more from the dentist were 22.1 per cent and 30.5 per cent. However, there was no tendency for people who were distant from the dentist to wait for decay, painful teeth, or money to pay dental bills, before seeing the dentist.

Although there was a relationship between distance from the dentist and whether he was seen every 6 or 12 months, it does not necessarily follow that the distance was the cause of the postponement. In many cases people who live in isolated areas have a lower standard of living and are less appreciative of dental health than are people in densely populated areas.

The distribution of family members according to distance from the dentist is shown in Table 11. Three out of every five persons went to a dentist less than five miles away.

About 12 per cent of the individuals who reported going to the dentist during the preceding 12 months indicated they had no dental expense during that period. Undoubtedly many of these individuals were in a series of dental treatments at the time of the survey and had not yet paid the dental bill for recent dental services.

The amounts spent for dental services during the preceding 12-month period were indicated by the housewife for each member of the family by checking an amount column as shown in Table 12. The most common dental bill per family member was "$1 to $9." Almost two-thirds of all dental bills reported were less than $20. Some annual dental bills, however, ran to $200 and more, and the mean dental bill reported was between $25 and $30. (The mean cannot be computed exactly because exact individual dental bills were not obtained.)

It is obvious that survey respondents not only overstated frequency of attendance at the dentist but also overstated the amount of their dental bills. On the basis of dental bills as shown in

Table 12 • Percentage of family members spending specified amounts for dental care during the previous 12 months, by age and sex

	No dental expense		$1-$9		$10-$19		$20-$29		$30-$39		$40-$59		$60-$79		$80-$119		$120-$159		$160 or more		Total	
Age	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
-4	88.0	87.7	7.8	9.6	3.0	1.5	1.0	1.2	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	100.0	100.0
5-9	49.9	50.3	32.1	26.8	9.5	15.0	4.3	4.7	1.0	1.9	1.8	.2	.4	1.1	.8	.0	.0	.0	.2	.0	100.0	100.0
10-14	41.2	33.4	24.2	31.1	13.7	12.3	9.5	10.0	5.7	4.1	2.1	4.4	.9	1.5	1.5	1.7	.3	.0	.9	1.5	100.0	100.0
15-19	27.0	24.8	25.8	22.6	12.9	18.1	12.0	6.6	8.6	11.5	8.2	5.3	1.7	1.3	3.0	1.8	.4	4.0	.4	4.0	100.0	100.0
20-29	44.9	31.8	15.0	23.1	15.5	17.1	7.5	7.6	6.2	5.1	4.6	6.9	2.9	2.3	1.1	2.9	1.3	.2	1.0	3.0	100.0	100.0
30-39	46.5	38.9	20.8	19.5	13.9	16.0	6.1	6.9	3.4	4.6	2.6	4.8	2.8	2.5	.6	2.3	1.7	2.0	1.6	2.5	100.0	100.0
40-49	50.5	41.9	17.5	19.2	14.0	15.8	5.8	5.6	2.0	3.7	2.4	4.2	2.2	2.1	2.7	3.3	1.5	1.5	1.4	2.7	100.0	100.0
50-59	57.4	46.6	14.3	19.7	13.4	14.5	2.8	4.7	2.1	3.1	2.8	2.4	2.1	1.3	2.1	2.1	1.2	1.6	1.8	4.0	100.0	100.0
60-69	64.5	57.5	13.3	15.1	9.4	7.6	1.9	5.1	2.3	2.7	2.3	2.1	.8	2.1	1.9	2.1	1.2	3.0	2.4	2.7	100.0	100.0
70-	69.3	64.2	12.4	16.2	9.5	6.4	2.9	3.5	.0	1.1	2.2	4.6	.0	.6	.0	.6	1.5	1.1	2.2	1.7	100.0	100.0
All ages	53.4	46.8	19.1	20.5	11.6	13.0	5.4	5.7	3.0	3.7	2.7	3.5	1.5	1.6	1.3	1.8	.9	1.2	1.1	2.2	100.0	100.0

Table 11, the total annual expenditures for dental care in the United States would be in the vicinity of 2 billion dollars. The U. S. Department of Commerce recently estimated consumer expenditures for dental care in 1952 at $1,028,000,000.

Table 12 is useful in comparing males and females and age groups with respect to dental expenditures. Under every amount column there is a larger percentage of females than of males. The percentage of males with no dental expense was greater than that of females in every age group except 5 to 9, where the difference was negligible. Although it is not possible to compute precise average expenditures from this table, expenditures per capita apparently were highest in the 15 to 19 age group for both males and females. Beyond this age expenditures declined very slightly with each age group, with a sharper decline in the "70 and over" group. Expenditures in the 5 to 9 age group were lower than in the "70 and over" group.

Discussions of the reasons why people neglect to go to the dentist usually center around two factors which are assumed to be paramount: cost and pain. In this survey, very few respondents admitted that either of these two factors prevented them from seeing the dentist during the preceding 12 months. A total of 9.4 per cent said that lack of money kept them from seeing the dentist and only 2.1 per cent mentioned the pain or unpleasantness of dental treatment (Table 13).

More than one-third (36.1 per cent) of the family members indicated the reason they did not see the dentist during the preceding 12 months was that there was no need to see him. This was expressed in various ways: "no cavities," "no toothaches," "perfect teeth," and so forth. The reason given by another third (33.5 per cent) of family members related to the absence of natural teeth: "too young," "wears dentures," or "no teeth."

Table 13 • Percentage distribution of family members who did not visit the dentist during preceding 12 months according to stated reason therefor

Stated reason	Per cent
No trouble	8.4
No cavities	3.8
Perfect teeth—good teeth	8.9
No indication of need	12.1
No toothaches—only occasional toothaches	2.9
Too young	10.1
Dentures—no teeth	23.4
Can't find time	2.2
Just hasn't gone—neglect	7.1
Inconvenience	0.7
Distance	0.2
Dentists too busy	0.4
Lack of money—insufficient funds	9.4
Hates to go—painful	2.1
Illness	0.6
Other	7.7
Total	100.0

It is interesting to note that only an insignificant number of family members stated they failed to see the dentist for reasons related to a shortage or maldistribution of dentists.

Housewives were asked: "Do you and/or the other members of your family pay dental bills on a time payment plan after completion of dental work?" To this question, 72.6 per cent checked "never," 18.5 per cent "sometimes," 5.9 per cent "usually," and 3.0 per cent "always." Those who checked "never" were asked whether members of the family would see the dentist more often or take better care of their teeth if dental bills could be paid on a time payment plan. To this question, one-fifth of the respondents answered "yes" and four-fifths answered "no." Although those who thought they could use a time payment plan to an advantage were in a minority, they represent millions of people.

The analysis of this survey will be concluded in a subsequent issue of THE JOURNAL.

B. Duane Moen, Director

The dentist's income tax return

W. S. McClanahan, LL.B., and Alban Weber, LL.B.,† Chicago*

The time of year has arrived when the tax collector again lies in wait for us around the corner. While most of the income tax problems which arise are common to many types of businesses and professions, certain special problems of dentists are worth exploring.

In the first place, most dentists derive all or the major part of their income from professional fees. As far as the tax collector and tax laws are concerned, the dentist in private practice has the same status as other taxpayers who are in businesses and professions and he files his returns on the same forms and schedules. The dentist is generally an "employer," (of his nurse or office assistant) and is required to withhold income taxes and social security taxes from the salaries paid and file the proper forms.

The dentist differs from many businessmen in that he is generally not an "employee," and no taxes are withheld from his earnings and paid by another person. Also he is one of the 14 professions specifically excluded from the Social Security Act and hence pays no self-employment tax. While there are no special provisions in the law or regulations relating to professional men, yet the practice of a profession has some special characteristics which differ from commercial enterprises and require different methods in preparing tax returns.

The present Federal Income Tax Law is a very complex structure of basic law, amendments, Treasury Department regulations and court decisions. Even those who specialize in income tax problems find the present laws difficult to interpret and apply to specific situations, and the layman finds it hopelessly confusing. The forms for filing tax returns have also grown complex with the changing laws and many of the schedules and lines refer us back to some other schedule or line, or to the instructions, for the desired information.

There is a thread of logic running through the law, however, and a little study by the ordinary taxpayer will enable him to understand the how and why of his income tax a little better. So get your copy of the U. S. Individual Income Tax Return for 1953 (Form 1040), and the instructions which come with it, (they are quite helpful) and we will examine the major items which determine your tax.

The first decision to be made involves the choice between using the short form 1040 or the long form 1040, (these are not really different forms, it is merely a difference in how you figure the tax). If your adjusted gross income is less than $5,000 and you do not desire to itemize the deductions for contributions, interest, taxes, and so on, an allowance of approximately ten per cent is arbitrarily permitted through use of the short form

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1040. Note that, in determining adjusted gross income for the purpose of this decision, deductions for professional expenses incurred in earning the income are subtracted first. For those using the short form, no further special attention will be given, since all problems applicable to them are also fully covered in discussing the long form 1040.

In filling out the long form, the first vital decision is whether or not to file a joint return with your wife. In all cases where the wife has no income, or considerably less than the husband, it is advisable to file a joint return. This "income splitting" provision, new in the Revenue Act of 1948, was a real break for the taxpayer. Because of the steeply graduated rates in the federal income tax law, this privilege of treating family income as two incomes instead of one produces a much lower tax. In higher brackets where both husband and wife have income, there are exceptional cases where separate returns are advisable. If this possibility exists, have your attorney or accountant prepare returns both ways to determine which produces the lower tax. In filling out a joint return use full names, for example, "George and Harriet Brown" rather than "Dr. and Mrs." When filling in the blanks for Social Security number, if any, and occupation, use the designators (H) and (W) to indicate husband or wife.

The first section of the return relates to the number of exemptions to which you are entitled. You are entitled to an exemption each for yourself and wife if making a joint return, and one for each child or close relative with a gross income of less than $600 who received more than half his support from you. Additional exemptions may be claimed for yourself and wife, if either or both are over 65 years old. Such additional exemptions are not available for your dependents.

An additional new taxpayer grouping was created by the Revenue Act of 1951, the so-called "Head of Household" category, which provides some measure of benefit to any unmarried taxpayer who maintains a home that he shares with a dependent, or with an unmarried child, grandchild or stepchild even though not a dependent.

Having determined your exemptions, you now turn to the very important part of the return, the portion relating to your income. If any of your income was from wages, salary or bonus from a business firm or a school, or any other source where tax is withheld from the pay check, the gross or total amount must be shown on the return. The amount withheld for taxes is entered separately and a copy of the form W-2 supplied by the employer should be attached to your return.

When you come to Items 2 and 3 on page 1, you find that dividends, interest and any other income (including your professional income) are grouped together and entered as one total. This is the first place where you cannot enter one figure until some other schedule is completed to give you that figure. In order to arrive at this total (adjusted gross income) you must first complete Schedules A to G on page 2.

Schedule A, income from dividends, and Schedule B, interest income from bonds, savings accounts, mortgages, personal loans, and so on, are self-explanatory. In the case of partially tax-exempt bonds, only the amount of taxable interest should be shown.

When you come to Summary Schedule C in the main form, "Profit (or Loss) from Business or Profession," you again find that this figure cannot be entered until it is arrived at by completing Separate Schedule C, a full-page form. Since this will include the total earnings from your profession and will take credit for all professional expense deductions, it is the most important part of the dentist's return and should be studied carefully. Except in unusual situations, the dentist is better served by using the cash basis in his return. On this basis, under "Total

Receipts from Profession" (Item 1), list all your actual cash receipts, but no uncollected fees. The nature of the dental practice is such that the "Cost of Goods Sold" does not apply, so Items 2 to 9 are disregarded. Thus the amount entered as "Gross Profit," is the same as was entered above for total receipts.

It is under "Other Business Deductions" that the dentist will take credit for the total expenses in earning his professional income. The first item is salaries, and here your nurse's salary, and that of any other assistants, is listed. Salaries paid to any of your children or your wife for services actually rendered are deductible; but if they exceed $600 a year, the child is no longer a dependent and one exemption is thereby lost; and in the case of your wife, her income must be added in the return.

Under the second item (12) rent is fully deductible for a building or suite used solely for a dental office. If the dentist has his office in his residence property, for which he pays rent, he may deduct that portion of the rent properly allocated to the office space. Quite often the ratio of the number of rooms used for office purposes to the total number of rooms in the property is used to determine the portion of rent deductible.

This question of occupancy expense carries over to the case where the dentist owns the property in which he maintains his office. If he uses the entire building for a dental office, then he may deduct the entire amount of mortgage interest (Item 13), real estate taxes (Item 14), depreciation (Item 17), repairs (Item 18) and other business expenses such as cleaning, heating, utilities, insurance, and so forth (Item 21). If the office is maintained in a residence property which he owns, then he may deduct only that portion of these expenses properly allocated to the space used for office purposes. It may be well to mention here that, all through the tax laws and regulations, the test applied to the deductibility of business expenses is the test of "reasonableness." If an expense is reasonably incurred in or related to the earning of taxable income, it is deductible. Of course the taxpayer and the Revenue Service often differ as to the definition of "reasonable," but rulings and court decisions are constantly marking out the limits in various situations.

Item 14, Taxes, includes Social Security tax, real estate taxes on property used for professional purposes and gasoline and auto license taxes to the extent that your car is used for professional purposes. (Driving from home to office and back is not a professional expense.) Special assessments for improvements such as sewers, sidewalks, and so on are not deductible taxes.

Casualty losses by fire, storm, theft, and so forth, of property used in your profession may be deducted (Item 15) to the extent not compensated by insurance. A separate statement should be furnished showing the date acquired, cost, depreciation, salvage value and deductible loss, together with a full description of the property, if this deduction is used. Bad debts (Item 16) also may be deducted in the year they are determined to be uncollectible, but this does not include uncollected fees, which were never included as income in previous returns.

Depreciation and obsolescence may be deducted for all dental equipment, instruments and furniture. These are capital items and their cost can be amortized over the period of their useful life. For most furniture and dental equipment, an arbitrary figure of ten years is used. A longer period applies to buildings and structures, of course, often 30 to 50 years, depending on the type of building. Land cannot be depreciated, and so its value should be subtracted in determining the cost basis of a building. Automobile depreciation is generally based on a four year useful life, with a salvage value at the end of the period, and can be de-

ducted to the extent your car is used for professional purposes. When reporting depreciation on office equipment and furniture, using the ten year period, the "composite" method may be used, grouping all equipment acquired at the same time. Interior construction costs in your office can be charged off over the period of the remaining formal lease in most cases. Any depreciation entered in Item 17 must be explained in detail in Schedule C-1 on the same page. Note that this depreciation is only for business property used by you in the dental profession. There is a separate place (Schedule H) for depreciation on business property not used in your profession, such as income earning real estate. Item 18, Repairs, also applies only to property used for your office and must be explained in Schedule C-2, on the same page. The other two Items (19 and 20) seldom apply on a dentist's return.

The final item (Item 21) is the catch-all, "Other Business Expense." The detailed itemization of these should be made in Schedule C-2. Here list cleaning, insurance, telephone, uniforms, laundry, and membership fees and dues for dental associations, postage, printing, cost of reception room magazines, light and gas bills, cost of collections, entertainment done solely for the promotion of practice, drugs and medications, laboratory fees, dental mechanic's fees, repairs to equipment, supplies, equipment useful for one year or less, rent of rental equipment, fees for professional assistance, expenses of travel to dental meetings or conventions outside of the home county, accounting fees, business taxes, and any other items used in the production of professional income.

The above deductions are then totaled and subtracted from "Gross profit" to produce so-called "Net profit." This same figure is then entered in the Summary of Schedule C on page 2 of form 1040 as "business profit." You may disregard the data on page 3 of Separate Schedule C, since this relates only to the tax on self-employment income, and dentists are specifically excluded from Social Security coverage. In the Schedule C Summary on Form 1040, you will note that farm profits and partnership profits are also summarized here, and must be detailed on the special forms 1040 F or 1065, respectively.

Schedule C having been completed, a report must be made in Schedule D of capital gains or losses during the taxable year. If you have had gains or losses from the sale or exchange of capital assets, a separate Schedule D should be included with the return. Although this schedule is long and looks formidable, a careful study of it and the instructions will enable you to fill in the data correctly. Similarly, Schedules E, F and G reporting income received from pensions and annuities, from rents and royalties, and from estates, trusts and other sources, respectively, are largely a matter of entering the figures in the blanks provided.

Only when you have completed all the schedules referred to earlier, (Schedules A through G) do you arrive at the total income which is to be entered as Item 3 on the first page of the return. Schedules H, I, and J, on page 2, which support the deduction for depreciation, the exemption, if any, claimed for a close relative, or the "Head of Household" determination, if applicable, should be filled in only if they apply in your case.

The remaining part of the return relates to nonbusiness deductions. A standard deduction may be taken, amounting to ten per cent of "Adjusted Gross Income," taken from Item 4 on page 1, but this may not exceed $1,000. If your deductions will exceed the $1,000 limit, then you should itemize them in the six classes shown. As you fill in these spaces, however, you must remember that these deductions are for nonbusiness items, and must not duplicate deductions already used in Schedule C in computation of professional income.

The first nonbusiness deduction is for contributions. These may not exceed 20 per cent of adjusted gross income, and must be for gifts to religious, charitable, educational, scientific, or literary organizations. Gifts to individuals or to political or propaganda organizations, or groups organized for profit are not deductible here. A second nonbusiness deduction is for interest paid on personal debts, such as bank loans or home mortgages. Interest on loans for professional purpose should be reported in Schedule C, not here.

Similarly, with taxes, the next allowable deduction, distinction between taxes allocable to profession and personal taxes must be made, and only the latter reported here. This includes personal property, real estate, and most state income, sales, gasoline and other nonbusiness taxes. In general, state taxes are deductible, federal taxes are not. There are so many of these taxes that you should refer to your accountant and published lists of deductible taxes to be sure. Casualty losses, nonbusiness, are deductible, to the extent not compensated by insurance, and should be explained on a separate statement as described earlier under business deductions.

Medical and dental expenses of your family and yourself are deductible only in the amount by which they exceed five per cent of your adjusted gross income, except that if either you or your wife are over 65, the entire amount of your medical expenses for both you and your wife may be claimed. The deduction must be reduced by any insurance or compensation received for these expenses, and is limited, in a joint return, to $2,500 with two exemptions, $3,750 with three, or $5,000 with four.

A "Miscellaneous" deduction can be taken for certain other nonbusiness items. The cost of protecting nonprofessional investments, the rent of a safety deposit box and investment counsel fees, for example, can be listed. Alimony or separate maintenance payments are deductible. Your share of taxes and interest if you live in a cooperative apartment are also deductible here.

When all of the items of income, capital gains, expenses, deductions and exemptions mentioned above have been entered, you are ready to compute your tax. The die is now cast. The rest of the computations are pure arithmetic. You merely enter, in the Tax Computation at the bottom of page 3 of Form 1040, the figures and totals previously entered in the schedules and lines referred to. A reading of the instructions and reference to the Tax Rate Schedule therein will give you your tax. Here you will note, with some sense of satisfaction, what the "income splitting" provisions of the Revenue Act of 1948 does to reduce your tax. Note that the difference in tax between that paid on a net income of $10,000 on a joint return, and a net income of $10,000 on a separate return, is more than $500.

When the tax is computed, enter it on line 5A on page 1, deduct the payments you have made through the year on your Declaration of Estimated Tax, (and also taxes withheld by an employer, if any), and you will have the final amount now due your government. If you have overpaid your tax on your estimate, you can indicate (on line 8) whether you want a refund, or want the overpayment credited on your 1954 tax. If you owe a balance, you have but three duties remaining: (a) Sign the return (and have your wife sign if it is a joint return); (b) mail it, with a check for the tax due, to your local Director of Internal Revenue before March 15; and (c) file your 1954 Declaration of Estimated Tax (on Form 1040ES) before March 15 and pay at least one fourth of the estimated tax. It may be noted here that the automatic reduction in personal income tax rates contained in the 1951 Revenue Act, amounting to about ten per cent, will take effect on January 1, 1954, and

should be considered in estimating your 1954 tax.

Filing a tax return, with all the supporting papers and documents required, and paying a heavy tax on the income you have worked so hard to earn, is not a pleasant duty. But it is a duty you share with almost every American who is employed or in a business or profession today. There is little in the present situation to indicate any startling reductions in our taxes in the near future. With this prospect, the dentist, as well as every other taxpayer, owes a duty to himself and his family to become as familiar as he can with our complex tax laws, regulations and forms. He should report his income and deductions honestly, but he should take advantage of every legitimate method of holding his taxes to a minimum.

Many a person pays unnecessary taxes simply because he does not understand the tax laws, or because he does not seek competent advice on technical problems. If you have a problem that you do not understand, consult your accountant or lawyer before you file your return. Entering the transaction correctly, taking a legitimate deduction that you did not know about, or supporting some item that might have been disallowed, may save you taxes amounting to several times his fee.

Finally, to keep out of trouble with the tax collector—keep records, good records. With almost every business transaction having some tax consequence today, clear, adequate, detailed records are a must. More arguments with the tax authorities are lost by the taxpayer because of lack of supporting records than for any other cause. Remember—that for every deduction which you put in your return, the burden is on you, the taxpayer, to be able to prove its correctness by clear and convincing records.

605 North Michigan Avenue

Radioisotopes • There has been developed . . . an extension [of use of radioisotopes] which goes one step beyond pure mechanical placement. . . . It demands that an organ of the body do some metabolic work in achieving the end localization. . . . Many isotopes have been tested for their metabolic pattern in tumor tissue. . . . Some give no localization; some localize in critical tissues, some give fair localization but have poor energy characteristics. Others have the wrong half-life. There was one rare example and probably no other simple element will be found which matches the promise of radioiodine. . . . The future usefulness of the metabolic positioning of radiation depends wholly upon research in basic tumor chemotherapy. . . . Most ideas in tumor chemotherapy have been complete failures. It is to be expected that most of our present and future ideas will also fail; but if one ever is successful, there are about 30 radioisotopes which have good radiation characteristics and may be attached to the molecule. Even though it has been a continuous source of disappointment, in this sense the metabolic placement of radiation is still the greatest challenge in the field of therapeutic radioisotope research. *M. Brucer, M.D., "Encouraging and Discouraging Research with Therapeutic Radioisotopes," Journal of Kentucky State Medical Association, June 1953.*

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LON W. MORREY, D.D.S., EDITOR
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Editorials

New enrollment period and new provisions to afford more members low-cost insurance

Members of the Association who have the misfortune not to own one of the low-cost accident and health insurance policies sponsored by the Association will soon have an opportunity to do so, according to a recent announcement of the Council on Insurance (see news section of this issue). The Council, complying with a request made by the Board of Trustees last September, has established a second enrollment period for the program extending from February 1 to May 1, 1954.

The purpose of this second enrollment period is: (1) to give every Association member an opportunity financially to protect himself and family at low cost against illness and accident, and (2) to enable physically impaired members, who otherwise could not qualify for such insurance, to obtain such protection against similar misfortunes. Probably, from an over-all standpoint, the second object is the most important at the present time, as the Association has thousands of hard working members whose years of overwork have rendered them under par physically and made them unacceptable for most types of health and accident insurance.

When this insurance program was inaugurated late in 1952, the Council cautioned that its ultimate success would depend on the enrollment of at least fifty per cent of the Association's members so that the insurance could become effective for those dentists who ordinarily are considered poor insurance risks. The Council anticipated—too optimistically it appears—that fifty per cent of Association members would avail themselves of this economical protection during the initial enrollment period. Unfor-

tunately, the first enrollment period closed 6,000 short of the required enrollment quota with the result that 3,300 members adjudged impaired, who needed but were denied protection, had their applications and checks returned.

Such criticism of the plan as has arisen has been met by two liberalizing modifications. One of these modifications, adopted early during the initial enrollment period, enables the plan to operate on a state basis. In those states in which fifty per cent of the members file acceptable applications, the physically impaired applicant as well as the physically fit applicant is provided policies. Already dentists in Arizona, California, Idaho, Territory of Hawaii, Nevada, New Mexico, New Jersey, New York, South Carolina and Utah enjoy those privileges. It is hoped that at the end of this second enrollment period all Association members will enjoy the same privileges as those afforded members in the ten constituent societies that have qualified.

The second modification, adopted recently, consists of raising the upper age limit for coverage from age 65 to age 70. This liberalization will be a real boon to hundreds of members who are still active but too old to meet the conditions laid down in most health and accident policies.

This health and accident insurance program, as was pointed out initially, is a new venture on the part of the Association—one undertaken at the urgent request of many dentists. Its success depends entirely on the manner in which it is accepted by members. Every dentist that invests in a policy not only supplies himself and his family with low-cost protection but helps his less fortunate, less healthy fellow practitioner to purchase similar protection.

The sooner each state dental society reaches its quota of fifty per cent, the sooner its physically impaired members—those who need insurance most—can obtain some protection at low cost—and at no extra cost to their more fortunate physically fit associates. The member who has not applied for this insurance or who has applied and not been accepted should seize this new opportunity, February 1, to help himself as well as his fellow members.

Sixth National Children's Dental Health Day focuses the nation's attention on pedodontics

Once again the advent of National Children's Dental Health Day stimulates the endeavors of American dentistry. Less than a month remains before constituent and component dental societies will bring to a climax the many weeks of work preparatory to the sixth annual observation of this special dental day for children—February 1.

It is gratifying to record the rapid growth of the National Children's Dental Health Day movement and to observe the enthusiastic manner in which dental societies and community leaders have embraced the idea and promoted its object. Each year finds more dental groups and more communities cooperating effectively in focusing attention on preventive dentistry for children. It is too early to report accurately on the number of dental societies that are participating this year; but, judged from the

requests for promotional and educational material received by the Bureau of Public Information, a sufficient number of constituent and component societies are cooperating to make the program truly national in scope and character. It is too early also to report on the various kinds of programs employed by the various societies or on the various devices used to stimulate community interest in dentistry for children; but movies, lectures, radio, television, playlets, pamphlets, posters and poster contests are being used to full advantage.

The Massachusetts State Dental Society, for instance, with the cooperation of the Commonwealth of Massachusetts Department of Education, is conducting a statewide dental health poster contest for junior high school children. The contest, which began October 1, concludes on January 10, and awards will be presented to the winning contestants on National Children's Dental Health Day, February 1. Thus, by using a bit of ingenuity, the facilities of the state educational system and a time-honored educational device, Massachusetts extends the beneficial influence of National Children's Dental Health Day from a short period of twenty-four hours to at least four months. Not to be outdone in ingenuity, the dentists of the county of Contra Costa, California, with the cooperation of the county health authorities, are using National Children's Dental Health Day as a peg on which to hang a county-wide children's poster contest on the subject of fluorine and dental health. These are but two of the many types of successful programs employed by the many dental societies this year in their observance of the sixth annual National Children's Dental Health Day. Others have been equally effective.

It is not too early to begin thinking of programs for the seventh annual National Children's Dental Health Day scheduled for February 1955. As a matter of fact, the Council on Dental Health of the Association already has selected a promotional feature for next year: local dental health working conferences. "As an effective method of helping to make the annual observance a year-round activity," the Council on Dental Health at its November meeting adopted a resolution to promote such local conferences to be conducted jointly by constituent and component dental societies and community groups. It might well be that the Massachusetts plan or, more particularly, the Contra Costa plan could serve as an excellent vehicle for many societies to drive to success in 1955. Since fluoridation is uppermost in the minds of most dental and many civic authorities and since violent and dogmatic opposition to the process seems to be firming up in certain localities even though scientific evidence of the dental value of fluoridation is mounting monthly, it appears that an educational program of fluoridation, including a poster contest on the subject, might be considered by dental societies in planning their 1955 National Children's Dental Health Day program. Certainly, the sooner dental society leaders educate community leaders to the health and economic value of fluoridation, the sooner emotional opposition will disappear and the sooner decisions regarding the use and effectiveness of this preventive measure will be made at a scientific level rather than on a political plane. As Leslie M. FitzGerald, president of the Association, states: "When a scientific health measure becomes a political issue, heat takes precedence over light, and the only losers are the small children of the community and the future generations who are thus deprived of the dental health benefits of this proven procedure."

During the short six years of its existence National Children's Dental Health Day has demonstrated its worth in the promotion of better child health. Perhaps by tying it in, as have the dentists of Contra Costa, with a fluoridation education program, it can become an even more effective health program in the future.

Washington News Letter

No committee of Congress commands greater respect than the House Ways and Means Committee, which has jurisdiction over all tax legislation. In addition, all proposals on alteration of the Social Security laws come within its province—all of which makes Ways and Means a group to be closely watched in 1954 for action of vital importance to the dental profession.

Both President Eisenhower and Rep. Daniel A. Reed (R., N.Y.), chairman of the House Ways and Means Committee, have expressed determination to broaden Social Security benefits and extend the law's coverage to 10,500,000 more Americans. With such strong impetus, it would seem practically certain that the statute will be amended this year.

On the Committee's heavy calendar of pending business are two other matters of particular interest to dentistry. These are (1) the Keogh-Jenkins bill authorizing dentists, physicians and other self-employed professional people to channel tax-deferred portions of annual income into retirement funds, and (2) numerous bills having the common aim of encouraging preventive and therapeutic health services by increasing the tax-deductibility of sums expended for medical and dental services.

Two years ago, Congressman Reed himself sponsored a bill to give professional workers a measure of income tax relief through the voluntary retirement fund method. In the current 83rd Congress, however, he has detached himself from this issue and has given no sign whether he will support, oppose or hold aloof from the proposal when it is brought up again in 1954.

There has been no commitment by Congressman Reed or any other influential Congressional leaders on medical expense deductibility. Its prospects, like those of the Keogh-Jenkins bill, are inextricably involved in the complex over-all subject of tax revision. Although many shrewd observers believe that the election year of 1954 will witness some lessening of the country's tax burden, they are more inclined to the theory that relief will be "across-the-board" rather than directed categorically to a few occupational groups or consumers of certain services.

On the other hand, the Eisenhower-Reed expressions of intent within recent weeks regarding Social Security extension portend the beginnings of a strong effort to blanket self-employed dentists into the program.

In a statement a few weeks ago, Rep. Reed said:

"The Republican party is determined to broaden and strengthen the Social Security system. I have already introduced a bill, at the request of the Administration, to extend Social Security coverage to approximately 10,500,000 persons not now covered. Our committee will hold full public hearings on this proposal at which time every interested group will be given an opportunity to testify.

"I believe that Social Security coverage should be extended to any group which desires it, assuming such an extension is administratively feasible. I am confident that our committee will provide Social Security coverage for many individuals who have been arbitrarily denied this protection in the past."

In some quarters, Representative Reed's statement that coverage "should be extended to any group which desires it" has been interpreted, conversely, as indicating his antipathy to providing coverage for any who do not desire it. This does not necessarily follow, however. Since its very inception nearly two decades ago, compulsory inclusion within the Social Security framework has been fiercely resisted, but to no avail, by many groups, associations and individuals. It was created in a Democratic administration and now is to be broadened—if Congress gives assent—in a Republican regime. As Congressman Reed said, opponents as well as supporters of extension will have their day in court (the public hearings probably will get under way before the end of January); but it is fallacious to assume that any occupational group has only to register its opposition to assure exemption of its members.

HOOVER COMMISSION

The medical task force of the Hoover Commission, which is studying further reorganization of the government's executive branch in the interest of increased efficiency, has been divided into four fact-finding units. The first meeting of the newly formed groups was held in Washington December 11.

The Veterans Administration's health and hospital services will be examined by a unit composed of the following: Basil C. MacLean of Rochester, chairman; Francis J. Braceland of Hartford, Conn.; Evarts A. Graham of St. Louis and Otto W. Brandhorst, also of St. Louis. Dr. Brandhorst is the sole dentist on the medical task force.

Association Affairs

ASSOCIATION ANNOUNCES RECORD 80,000 MEMBERS

Membership in the American Dental Association reached a record total of 80,019 on December 10. Active and life members totaled 70,253 and student members, 9,559. In other membership classification, there were 187 affiliate, 10 associate and 10 honorary members.

SPECIAL COMMITTEE NAMED TO STUDY SCIENTIFIC SESSION

A special committee of the Board of Trustees has been appointed to study ways and means of improving the Association's scientific program, it has been announced by Leslie M. FitzGerald, president.

Lewis W. Thom of Minneapolis, trustee from the Tenth District, is chairman of the special committee; other members are Paul H. Jeserich of Ann Arbor, Mich., trustee from the Ninth District, and Charles I. Taggart of Burlington, Vt., trustee from the First District.

The appointment of the special committee is in accordance with a recommendation presented to the 94th annual session by Otto W. Brandhorst, past president of the Association, announced Dr. FitzGerald.

HOSPITAL GROUP LIBERALIZES DENTAL STAFF RULES

The Joint Commission on Accreditation of Hospitals, after consultation with the Special Committee on Problems in the Field of Oral Surgery and the Council on Hospital Dental Service of the American Dental Association, has agreed that in the Commission's *Manual on Hospital Accreditation*:

(1) the bylaws on the dental staff be interpreted to mean that the dental staff might admit and discharge dental patients; and

(2) the bylaws on the staff indicate that the hospital staff would be a "medical and dental staff."

Leslie M. FitzGerald, president of the American Dental Association, is chairman of the Special Committee and Frank Hower of Louisville, Ky., is chairman of the Council.

ENROLLMENT DRIVE FOR GROUP INSURANCE PLAN TO OPEN

A second enrollment campaign will open February 1 to qualify the American Dental Association's Group Plan for Accident and Health Insurance for all applicants.

During the charter enrollment period last year, about 7,000 applicants were accepted for insurance and about 3,300 failed to qualify as acceptable risks. If 17,000 applications had been received, all applicants would have been accepted, announced Paul Zillmann of Buffalo, insurance trustee for the Association.

"Every dentist whose application was returned to him will be urged to send a new application to me," states Dr. Zillmann, "I will hold these applications to see whether we obtain the required number before submitting them to the insurance company."

When the national quota for qualifying the group plan was determined, the Association received credit for the 11,000 dentists in California, Utah, Nevada, New Jersey and New York who are already insured in identical plans by the National

Casualty Company of Detroit, underwriters of the Association plan. The policies of those state dental societies have been in operation for as long as 15 years.

The Association policy covers illness up to two years, with monthly payments up to $400 beginning on the eighth day of total disability; a dentist does not have to be confined to his home to receive this payment.

Under the accident clause the dentist can collect for a period of five years for total disability and six months for partial disability, the limit of time for total and partial disability being five years. In the event of accident the policy pays from the first day.

The maximum coverage for acceptable risks is $400 each month; the maximum for those who have some physical disabilities is $200 each month.

To provide greater coverage for all Association members the Board of Trustees has added to the policy a fourth age group, dentists from 65 to 70 years of age. Any dentist who has the insurance before he is 65 will not pay an increased premium when he goes into the new age group. Although the age limit for acceptance is 70, there is no age limit for renewing the insurance.

Semiannual premium rates begin at $16.05 for dentists up to 50 years old for a $100 monthly accident benefit, $3,000 accidental death benefit and $5,000 dismemberment benefit. Increased premiums are required for increased benefits and older age groups.

OBED MOEN, FLOYD PILLARS ACCEPT COUNCIL APPOINTMENTS

Obed W. Moen of Watertown, Wis., and Floyd W. Pillars of Des Moines, Iowa, have accepted *ad interim* appointments to Association Councils, it has been announced by Leslie M. FitzGerald, president.

Dr. Moen, former Association trustee, will fill the vacancy on the Council on International Relations caused when Paul Jeserich of Ann Arbor became trustee from the Ninth District.

Dr. Pillars will fill the vacancy on the Council on Legislation caused when Edward R. White of Jersey City became trustee from the Fourth District.

The appointments are effective until the 1954 annual session of the House of Delegates at Miami next November.

COMMITTEE TO STUDY TRUSTEE DISTRICT REVISION

Revision of the Association's trustee districts will be studied by a special committee of the House of Delegates which was appointed in mid-December by Leslie M. FitzGerald of Dubuque, Iowa, Association president.

The special committee is to submit a report on the matter to the 1954 annual session, in accordance with a directive of the 1953 House of Delegates.

Chairman of the committee is Harold W. Oppice of Chicago; other members are Perley M. Cunningham of Cheyenne, Wyo.; William N. Hodgkin of Warrenton, Va.; John P. Looby of Philadelphia and Henry M. Willits of Dubuque.

DENTAL HEALTH PROGRAMS IN SCHOOLS TO BE EXPLORED

School children's dental health will be discussed from the viewpoint of the dentist, the health educator and the classroom teacher at a Council on Dental Health conference January 25-26 with representatives of eleven national educational organizations.

The conference will be designed "to improve the Association's school dental health education program and to explore new methods by which state and local dental societies can assist school personnel," announced David Brock, chairman of the Council, during its meeting November 23-24.

RELIEF FUND CONTRIBUTIONS REACH $70,597 DECEMBER 15

Contributions to the Association's Relief Fund totaled $70,597.02, or 70.6 per cent of the current goal of $100,000, as of December 15, it was announced by the Council on Relief.

This was $8,500 more than the December 15 total last year. Although a breakdown of figures for each constituent society was not available as of December 15, figures for December 1 revealed that seven societies had topped their quotas as of that date. They were Alabama, Alaska, the District of Columbia, Nevada, North Dakota, Oklahoma and Tennessee.

As of December 1, also, $548 had been contributed by students, dentists in unorganized regions and associate members. Contributions of constituent societies through November 30 were as follows:

Quota Over $900.00

	Quota	Contributions to Nov. 30	Pct.
California	$ 3,740.00	$ 2,583.50	69.1
So. California	4,530.00	2,387.50	52.7
Colorado	920.00	346.00	37.6
Connecticut	1,930.00	1,219.12	63.2
Florida	1,270.00	925.00	72.8
Georgia	1,040.00	554.50	53.3
Illinois	7,370.00	5,140.50	69.7
Indiana	2,350.00	1,663.00	70.8
Iowa	1,860.00	1,655.80	89.0
Kansas	990.00	631.65	63.8
Kentucky	1,120.00	313.00	27.9
Louisiana	1,010.00	814.50	80.6
Maryland	1,060.00	712.00	67.2
Massachusetts	3,780.00	2,514.33	66.5
Michigan	4,010.00	2,963.00	73.9
Minnesota	2,940.00	1,812.00	61.6
Missouri	2,530.00	1,653.56	65.4
Nebraska	1,060.00	213.00	20.1
New Jersey	4,070.00	2,480.00	60.9
New York	15,210.00	6,476.00	42.6
N. Carolina	1,230.00	472.00	38.4
Ohio	4,980.00	3,071.50	61.7
Oregon	1,200.00	755.50	63.0
Pennsylvania	6,830.00	3,628.50	53.1
Tennessee	1,200.00	1,938.50	161.5
Texas	3,160.00	1,458.50	46.2
Virginia	1,130.00	721.50	63.8
Washington	1,780.00	1,376.50	77.3
Wisconsin	2,910.00	1,475.00	50.7
Total	$ 87,210.00	$51,955.96	59.6

Quota of $900.00 or less

	Quota	Contributions to Nov. 30	Pct.
Air Force	$ 600.00	$ 181.50	30.3
Alabama	750.00	887.11	118.3
Alaska	50.00	122.00	244.0
Arizona	280.00	76.00	27.1
Arkansas	560.00	322.00	57.5
Army	630.00	184.00	29.2
Delaware	160.00	105.00	65.6
Dist. of Col.	850.00	1,135.00	133.5
Hawaii	360.00	256.00	71.1
Idaho	260.00	136.00	52.3
Maine	450.00	212.00	47.1
Mississippi	520.00	334.50	64.3
Montana	370.00	312.50	84.5
Navy	830.00	257.00	31.0
Nevada	90.00	93.50	103.9
N. Hampshire	290.00	199.00	68.6
New Mexico	250.00	189.50	75.8
North Dakota	340.00	432.05	127.1
Oklahoma	890.00	992.00	111.5
P. Canal Zone	20.00	.....	...
P. Health Serv.	260.00	72.00	27.7
Puerto Rico	190.00	28.00	14.7
Rhode Island	580.00	326.00	56.2
So. Carolina	410.00	228.00	55.6
South Dakota	340.00	141.00	41.5
Utah	450.00	203.40	45.2
Vermont	190.00	96.00	50.5
Vet. Admin.	900.00	196.65	21.9
West Virginia	740.00	502.00	67.8
Wyoming	180.00	78.00	43.3
Total	$ 12,790.00	$ 8,297.81	64.9

ACCEPTED DENTAL REMEDIES, 1954 EDITION, PUBLISHED

Sections on trichloroethylene, general anesthetics and dentifrices and mouthwashes are contained in the 1954 edition of *Accepted Dental Remedies*, now available for distribution.

Published annually by the Council on Dental Therapeutics, the 206-page book contains a listing of commercial products which are currently accepted by the Council and descriptions of those therapeutic items which are of demonstrated usefulness in dental practice.

The new edition may be purchased for $2.00 from the Association's Order Department, 222 East Superior Street, Chicago 11.

COUNCIL ON DENTAL HEALTH ISSUES NEW PERIODICAL

Dental Health Highlights, a new monthly publication of the Council on Dental Health, replaces the Council's *News Letter* beginning with the January 1954 issue.

The four-page periodical will be printed rather than mimeographed and will be sent to a select circulation of 2,500 dental public health officers in federal, state and municipal agencies, Council on Dental Health members of the Association and its constituents, and others active in public health dentistry.

NEW "DAREDEVIL DAVEY" BOOK ANNOUNCED BY ASSOCIATION

Daredevil Davey Makes the Team, the fifth in the series of children's dental health comic books, has been issued by the Division of Dental Health Education. Single copies are available from the Division; quantity orders may be addressed to the Order Department.

Prices, identical with those listed in the Association catalog for other "Daredevil Davey" booklets, are: $2.85 for 25 copies; $5.15 for 50 copies and $8.85 for 100 copies.

The story concerns an exciting baseball game but includes instructions on diet, health, dental care and safety habits.

DENTAL HYGIENE PROGRAM APPROVED BY COUNCIL

The Council on Dental Education has announced the approval of the dental hygiene program conducted at the Fairleigh Dickinson College in Rutherford, N. J., under the direction of Walter Mosmann.

This brings the number of accredited dental hygiene programs to 22. The other programs which have been evaluated thus far were listed in the September 1953 issue of THE JOURNAL as a report of the Council on Dental Education.

The Council will continue to gather data on the other schools which have dental hygiene programs, and additions to the original listing will be made in the future, the Council announced.

MEMBERS ASKED TO TELL PLANS FOR ATTENDING F.D.I. MEETING

Members of the American Dental Association who plan to attend the 1954 annual session of the Fédération Dentaire Internationale are requested to notify Harold Hillenbrand, secretary of the Association, as soon as possible. The session will convene June 6 in The Hague, Netherlands.

Dr. Hillenbrand may be addressed at the Association's Central Office, 222 East Superior Street, Chicago 11.

TENTH LICENSURE CONGRESS TO BE HELD FEBRUARY 6

The tenth Congress on Dental Education and Licensure, to be held February 6 in the Conrad Hilton Hotel, Chicago, will present two panel discussions, "What Should Be the State Board's Responsibility to the Public for the Continued Competence of the Practitioner?" and "What Changes Do Recent Graduates Suggest for the Practices of the State Boards and for the Curriculum of the Dental Schools?"

The Congress, designed for dental educators and examiners, is sponsored by the Council on Dental Education.

During the morning session on state boards' responsibility for the continued competence of the practicing dentist, the moderator will be Henry A. Swanson, former member of the District of Columbia Board of Dental Examiners.

Panel participants will include George W. Teuscher, dean of the Northwestern University Dental School; Lester W.

Burket, dean of the University of Pennsylvania School of Dentistry; Russell I. Todd, president-elect of the American Association of Dental Examiners, and Hugh B. Smith, secretary of the Ohio Board of Dental Examiners.

The afternoon session, on suggested changes in state board practices and dental school curriculum, will be moderated by Raymond J. Nagle, dean of the New York University College of Dentistry.

Members of the afternoon panel will be Archie A. Albert, president of the American Association of Dental Examiners; O. M. Dresen, dean of the Marquette University School of Dentistry; Carl A. Frech, secretary of the Indiana Board of Dental Examiners; Vernon L. Hunt, vice-president of the American Association of Dental Examiners; Harry B. McCarthy, dean of Baylor University College of Dentistry, and Reuben E. V. Miller, member and former secretary of the Pennsylvania Board of Dental Examiners.

AMERICAN DENTAL DIRECTORY FOR 1954 NOW AVAILABLE

The latest state-by-state requirements for dental licensure examination are listed in the 1954 edition of the *American Dental Directory,* now being distributed by the Order Department of the Association.

In addition to listing dentists both alphabetically and geographically, the *Directory* lists educational institutions: dental schools, dental hygiene schools, dental assistants schools and dental laboratory technicians schools; and organizations: officials of the Association, officials of constituent dental societies, state boards of dental examiners, state dental health divisions, specialty boards, national dental organizations in the United States and dental organizations of the world.

Dental specialists are listed geographically, as are affiliate members of the Association throughout the world.

The *Directory* may be purchased for $7.50 from the Order Department, American Dental Association, 222 East Superior Street, Chicago 11.

NOMENCLATURE CONFERENCE REPORT ISSUED

Part I of a mimeographed report on the Nomenclature Conference held last June, sponsored by the Bureau of Library and Indexing Service, was issued January 1. This part deals with papers on principles and trends of scientific terminology. Part II, a vocabulary of the terms considered at the Conference, will be issued within this month. Copies are available on request to Donald Washburn, director of the Bureau of Library and Indexing Service, 222 East Superior Street, Chicago 11.

SPECIALTY BOARDS' EDUCATION PROBLEMS TO BE DISCUSSED

A three-day workshop dealing with the educational problems of the dental specialty boards will be held March 3-5 in Chicago by the Council on Dental Education. It is expected that each of the seven specialty boards will send several representatives and that the dental schools and hospitals will also be represented at the workshop conference.

The Council's committee on dental specialties is composed of Philip E. Blackerby, Jr., chairman, and Arthur W. Easton, Bert L. Hooper and A. H. Grunewald.

Some of the problems to be considered by workshop groups will be (1) the particular skills which are required of the diplomate; (2) the examination questions which should be used for evaluating the applicant; (3) the content of graduate and postgraduate courses which will provide the best training for the applicant; and (4) the type of hospital educational program which will assist in the training of the applicant.

Dental Societies

GREATER NEW YORK MEETING ATTRACTS 15,808

A panel of prominent medical authorities linked cigarette smoking with cancer of the lung and cardiovascular diseases in a symposium which highlighted the 29th annual Greater New York Dental Meeting.

Participants in the symposium December 8 were Alton Ochsner of Tulane University School of Medicine, Grace M. Roth of the Mayo Clinic and University of Minnesota Medical School, Ernest L. Wynder of the Sloan-Kettering Institute for Cancer Research and Irving S. Wright of Cornell University Medical College, whose report was read in his absence.

All agreed without qualification that a causative factor in lung cancer was some substance in tobacco tars.

A record-breaking attendance of 15,808 persons was reported at the meeting, which was presented December 7-11 under the auspices of the First and Second District Dental Societies of the State of New York.

More than 2,800 dentists filled two viewing rooms to capacity during the three sessions of television clinics and the two sessions of projected clinics in color, announced Arthur E. Corby, general chairman of the meeting.

In an address to a general session of the meeting, Leslie M. FitzGerald, president of the American Dental Association, expressed concern at the "current wave of false and misleading claims" in the advertising of dentifrices.

The dental profession must oppose these advertising claims, said Dr. FitzGerald, "because false advertising may result in damage to the dental health of the individual who believes uncritically what he reads or sees or hears."

Dr. FitzGerald also urged that fluoridation be adopted in all United States communities. "I am confident that in time, fluoridation will be as common throughout the United States as chlorination of water and pasteurization of milk are today," he concluded.

In addition to Dr. Corby, general chairman, the organization committee of the meeting included William S. Curran, acting chairman; Stanley G. Standard, advisory chairman and Leon E. Sahlin, secretary-treasurer.

DENTAL RESEARCH IN CAPITAL TO BE THEME OF MEETING

"New Horizons in Dental Research in the Washington Area" will be the theme of the 22nd annual Postgraduate Clinic of the District of Columbia Dental Society, to be held March 14-17 at the Shoreham Hotel, Washington, D. C.

From the federal and university centers of dental research in the Capital will be drawn exhibits, essayists and clinicians, as well as panelists for discussions on occlusion, focal infection and oral cancer detection.

Table clinics and registered clinics will feature research staff members of the Armed Forces, Georgetown University Dental School, National Bureau of Standards, National Institute of Dental Research and the U. S. Public Health Service, announces Louis Dubit, general chairman.

DENTAL SOCIETY EXECUTIVE, L. T. MALONEY, RESIGNS

L. T. Maloney, assistant to the president of the Massachusetts Dental Society, has resigned his position and will open a public relations office in Boston.

Mr. Maloney has been with the Society since July 1944; he formerly did publicity and public relations work with the *Boston Herald-Traveler*, *New York Times* and the Office of Price Administration.

COURT ADVISED TO CONTINUE CASE AGAINST LABORATORIES

In the Chicago Dental Society's suit against a group of advertising Chicago dental laboratories, sufficient evidence of violations of the Illinois Dental Practice Act has been produced to continue the hearing, a master-in-chancery of the Cook County (Chicago) Superior Court advised November 30.

Rejecting a motion of the defendants that the case be dismissed, Master-in-Chancery Frank S. Righeimer, Jr., stated that the Chicago Dental Society has produced "evidence of a violation or violations of the Dental Practice Act [of Illinois] and evidence that such violations constitute a public nuisance and require injunctive relief."

The defendants' motion to dismiss the case for insufficient evidence was made at the conclusion of the presentation of evidence by the Chicago Dental Society. More than 2,700 pages of testimony and 275 exhibits were submitted by the Society in the presentation of its case.

The suit was started three years ago against 36 laboratories and the publisher of the Chicago classified telephone directory. Defendants now total 27 laboratories; the directory publisher was dropped as a defendant after he agreed to accept the final decision of the court.

The injunction sought by the Dental Society in its suit would bar not only directory advertising, but the use of newspaper and magazine advertisements, neon signs, direct mail campaigns and the display of dental appliances in show windows. The Illinois Dental Practice Act specifies that dental laboratories must deal exclusively with licensed dentists.

INDUSTRIAL DENTAL PROGRAMS TO BE STUDIED AT WORKSHOP

"Occupational Oral Health in General Dentistry and Public Health" will be the topic of the second annual workshop to be presented January 22 in the Statler Hotel, New York City, by the First District Dental Society of the State of New York with the collaboration of the Institute of Industrial Medicine, New York University Postgraduate Medical School.

A morning panel on "Oral Health Standards for the Employee on the Job" will include discussions by Anthony J. Lanza, professor and chairman of the department of industrial medicine, Postgraduate Medical School, New York University; W. Philip Phair, secretary of the Council on Dental Health, American Dental Association, and Ira Dow Beebe of Bridgeport, Conn., chairman of the Council's committee on industrial dental health programs.

The afternoon panel, "The Scope of Dental Services in Occupational Health Programs," will feature papers by C. D.

The newly rebuilt headquarters of the Southern California State Dental Association, shown here, is situated about five miles from the downtown business district of Los Angeles. Purchased outright in 1946, the building was torn down to the foundation this year, rebuilt to special requirements and expanded to 3,600 square feet of working space. In addition to being the Central Office of the Southern California State Dental Association, it is the headquarters also of the Los Angeles County Dental Society and the First District Dental Society of California.

Marshall-Day, dean of Tufts College Dental School, and Howard E. DeCamp, member of the executive board of the American Association of Industrial Dentists.

M. E. Burnham, a director of the First District Dental Society, will preside.

Alfred J. Asgis of New York, chairman of the Workshop, has announced that the event will be open free of charge to all interested dentists. Registration forms may be obtained by writing to Public Health Workshop, First District Dental Society, Hotel Statler, New York 1.

DALLAS DENTAL SOCIETY ANNOUNCES MIDWINTER CLINIC

Eight clinicians will present full-day and half-day courses at the 27th Dallas Mid-Winter Dental Clinic, to be presented by the Dallas County Dental Society January 24-27 at the Adolphus Hotel, Dallas, Texas.

Featured clinicians and their subjects will include Francis Summers of Los Angeles on pedodontics; O. B. Coomer of Louisville, Ky., on restorative dentistry; William Branstad of St. Paul on periodontics; Bertram H. Downs of Colorado Springs on full dentures; Donald A. Keyes of Lincoln, Neb., on restorations of silver amalgam; Joseph J. Martini of Passaic, N. J., on oral roentgenology; Hermann Becks of San Francisco on roentgenographic interpretation of local and systemic origin; Hollis A. Askey of Lincoln, Neb., on practice management.

Dentists from Mexico, as well as from the southwestern United States, have been invited to attend the courses. Registration may be made by addressing W. C. McCaskill, Jr., chairman, 1329 Medical Arts Building, Dallas, Texas.

National Defense

NAVY SHORTAGE OF DENTISTS THREATENS NEW DRAFT CALL

An early call-up of more dental officers by Selective Service was forecast recently when the Navy notified the Department of Defense that it will need 100 dental officers early in 1954, probably by February 1.

Unless the Department of Defense can reallocate or reassign to the Navy a sufficient number of Army and Air Force high priority reservists awaiting orders to active duty, it will be necessary to requisition more dentists from Selective Service.

According to the Council on Federal Dental Services, Selective Service listed 361 Priority I and II dental special registrants as commissioned but not yet on active duty as of September 30, 1953. It also listed 305 available and acceptable Priority I and II dental special registrants who had not yet been commissioned as of September 30, the Council states. In the Priority III category were listed 538 dental special registrants who were commissioned and awaiting orders to active duty.

"It would seem, from the figures revealed by Selective Service," a Council memorandum notes, "that the Navy's anticipated shortage of 100 dental officers might readily be satisfied without the necessity of making Selective Service calls upon the older age groups within Priority III."

The Council suggested that Priority I and II registrants with commissions in the Army or Air Force who are not needed by those services be reassigned to the Navy, as well as those young Priority

III dentists, doubly liable as regular registrants, who hold Army and Air Force commissions.

"Any new Selective Service call upon the older age group within Priority III at this time could not, according to the Selective Service figures, be justified," the Council concluded.

ARMED FORCES DEDICATE NEW INSTITUTE OF PATHOLOGY

The cornerstone for the new building of the Armed Forces Institute of Pathology was laid October 20 in ceremonies that featured an address by Melvin E. Casberg, retiring Assistant Secretary of Defense (Health and Medicine).

More than 1,500 attended the ceremonies marking the Armed Forces' first joint construction project at the Walter Reed Army Medical Center. Brig. Gen. Elbert DeCoursey, MC, USA, director of the Armed Forces Institute of Pathology, presided. Assisting Dr. Casberg in the laying of the cornerstone was Brig. Gen. Raymond O. Dart, MC, USA (Ret.) former director of the Institute.

Now located on Independence Avenue, the Institute will be moved into the new building late this spring. Designed for resistance to atom-bomb attack, the Institute will have five stories above ground and three below. Concrete blast walls reinforced with steel enclose the main portion of the building, which is window-

Harold Hillenbrand, secretary of the American Dental Association, spoke on "The American Dental Association and the Department of Defense" at graduation ceremonies held November 16 at Walter Reed Army Medical Center for dental reserve, active duty and civilian students who had completed the dental service operation and administration course of the Army Medical Service Graduate School.

Standing at the rostrum is Brig. Gen. E. W. Cowan, director of dental activities at the Center. Other participants and guests included (front row, l. to r.) Sen. Lester C. Hunt of Wyoming; Brig. Gen. Marvin E. Kennebeck, assistant for dental services, Office of the Surgeon General, U. S. Air Force; Maj. Gen. Walter D. Love, chief of the Dental Corps, U. S. Army; Maj. Gen. Leonard D. Heaton, Commanding General, Walter Reed Army Medical Center; Dr. Hillenbrand. In the second row are Lt. Col. William D. Tigertt, assistant commandant of the Graduate School; Col. John S. Oertel, director of the School's dental division; Herbert B. Bain, director of the Association's Bureau of Public Information; C. Willard Camalier, assistant secretary of the Association; Lt. Col. A. V. Bradley, post chaplain of the Medical Center.

The first woman dentist awarded a commission in the U. S. Air Force Dental Service, Lieut. Raya Rachlin (center), is shown as she was sworn in recently at USAF Headquarters by Maj. Gen. Harry G. Armstrong (right), Surgeon General of the Air Force. Col. Walter H. Bird, USAF, DC (left) witnessed the ceremony. Dr. Rachlin received the degree of Doctor Medicinae Dentium from the University of Berlin (Germany) in 1937 and the degree of Doctor of Dental Surgery from Howard University in 1952.

less, except for an administrative wing.

C. Willard Camalier, assistant secretary of the American Dental Association, and Henry A. Swanson, chairman of the Council on Registry of Dental and Oral Pathology, attended the ceremonies.

THERAPEUTICS SEMINAR GIVEN AT NAVAL DENTAL SCHOOL

A seminar on therapeutics was presented November 6 for the staff, students and guests of the U. S. Naval Dental School, Bethesda, Md., by Col. Jack B. Caldwell of Washington, D. C., chief of the oral surgery section, Walter Reed Army Medical Center; Daniel F. Lynch of Washington, D. C., president-elect of the American Dental Association, and Cmdr. Clarence H. Blackstone of Bethesda, Md., chief of the oral surgery service at the School.

FORMER DEFENSE SECRETARY CITES GENERAL RENFROW

Brig. Gen. Louis H. Renfrow, deputy director of the Selective System and a Reserve dental officer since 1917, was cited for his contributions to defense policies recently by Louis Johnson of Washington, D. C., former Secretary of Defense.

In a letter to the president of the Reserve Officers Association of the United States, Mr. Johnson recalled that General Renfrow prepared and wrote the charter and the organization plan of the present Reserve Policy Board of the Secretary of Defense. He also proposed and developed the Reserve medal now authorized for all of the Armed Forces, Mr. Johnson declared in his note.

General Renfrow was the first Reserve Officer of the Army Dental Corps to be promoted to flag rank. He was graduated from Washington University School of Dentistry in 1917.

BRONZE STAR MEDAL AWARDED TO DENTAL OFFICERS

Cmdr. Philip A. Canal, DC, USN, and Lieut. James H. Snyder, DC, USN, have been awarded the Bronze Star Medal with Combat "V" for outstanding service in Korea. The decorations were presented in November by the Commanding General of the First Marine Division in recognition of the dental officers' meritorious achievements while serving with Marine regiments in Korea during the period December 1952-August 1953.

Commander Canal, a graduate of Temple University School of Dentistry in 1932, is now on duty at the Naval Dental Clinic, Brooklyn. Lieutenant Snyder, who was graduated in 1947 from Northwestern University Dental School, is serving in the dental department, Mare Island Naval Shipyard, Vallejo, Calif.

Dental Education

MEDICAL COLLEGE OF VIRGINIA TO DEDICATE NEW BUILDING

The Medical College of Virginia School of Dentistry will dedicate its new Wood Memorial Building February 1 during the School's annual alumni homecoming, it has been announced by Harry Lyons, dean.

The homecoming program will consist of lectures to be presented February 1-2 by H. B. G. Robinson of Columbus, Ohio; Lewis Fox of New York; Allan G. Brodie and LeRoy E. Kurth of Chicago. Films, a panel discussion, two luncheons, a reception and a banquet will complete the program.

GEORGETOWN DENTAL SCHOOL TO OFFER FELLOWSHIP

Georgetown University School of Dentistry will offer a combined fellowship of one year in periodontics and endodontics, to begin in August 1954, announces Clemens V. Rault, dean.

Information may be obtained by writing to Dr. Rault, School of Dentistry, Georgetown University, Washington 7, D. C.

DENTAL RESIDENCY OFFERED BY PHILADELPHIA HOSPITAL

Children's Hospital of Philadelphia is accepting applications from recent dental graduates for a one-year, full-time dental residency which begins July 1, 1954. The yearly stipend is $1,200 and maintenance.

The residency provides training in pedodontics, minor oral surgery and general anesthesia. Opportunities are also provided for participation in the dental program associated with the treatment of cerebral palsy.

Further information may be obtained from Raymond Werther, chief of dental service, The Children's Hospital of New York.

Applications may be submitted to Herbert McC. Wortman, executive vice-president, the Children's Hospital of Philadelphia.

GRADUATE COURSE IN ORTHODONTICS ANNOUNCED

Applications will be received to March 1 for the graduate course in orthodontics at the University of Toronto. The course will commence September 1 and will continue for a period of 17 months.

Enrollment is limited to six graduates of approved dental schools. Applicants must have scholastic standing acceptable for enrollment for the Master of Science (Dent.) degree in the University's School of Graduate Studies.

Further information and application forms are available from the dean, Faculty of Dentistry, University of Toronto, 230 College Street, Toronto, Ontario, Canada.

INTERNSHIP, RESIDENCY IN ORAL SURGERY ANNOUNCED

An internship and residency in oral surgery is again being offered by the University of Louisville School of Dentistry, in cooperation with the Louisville and Jefferson County Board of Health and Louisville General Hospital.

Applicants are advised to apply by February 1; the position will open July 1. Because the number of positions is limited, only citizens of the United States will be considered for training.

Interns selected will serve a tour-of-duty in the department of anesthesiology, where they will administer anesthetics for both major and minor surgery. In addition they will attend a graduate course in pathology at the University of Louisville School of Medicine and will act

as first assistant on selected major oral surgery cases.

The residency is open only to trainees who have had an internship in an approved hospital. The resident is responsible for the efficient management of the oral surgery clinic and assists in teaching exodontics to junior dental students.

The dental service has been approved by the Council on Hospital Dental Service and the educational program has been approved by the Council on Dental Education. The program is acceptable as training for examination by the American Board of Oral Surgery.

ORAL SURGERY INTERNSHIP OFFERED IN SAN FRANCISCO

An internship in oral surgery will be available July 1, 1954, at the San Francisco Hospital, it has been announced by Melvin J. Sherman of the University of California College of Dentistry.

Application forms may be obtained by writing to the College at the University of California Medical Center, San Francisco 22.

UNIVERSITY OF BUFFALO HONORS FOUR DENTAL ALUMNI

Citations for outstanding service were awarded December 12 to four dentists by the University of Buffalo at the two-day dedication ceremony for the University's new medical and dental building, Samuel P. Capen Hall. All four are graduates of the University.

Honored were:

Charles F. Bodecker, formerly of Columbia University dental school, for leadership in dental education;

Walter H. Ellis of Buffalo, for dentistry, especially orthodontics;

Edson J. Farmer of the University of Buffalo, for dental education;

Charles A. Pankow of Buffalo, for dentistry.

DENTAL SCHOOLS SCHEDULE POSTGRADUATE COURSES

Illinois • The annual one-day course in periodontics presented by the University of Illinois College of Dentistry immediately after the Chicago Midwinter Meeting will be offered February 11. Subject of the course will be correction of occlusal disharmonies.

Morning session will consist of lectures; the evening session will include a round table discussion and open forum. In the afternoon laboratory sessions, TV cameras will bring step-by-step instructions to each participant individually, announces Saul Levy, coordinator of postgraduate studies. Each student will receive a set of models mounted on a Hanau articulator and will complete equilibrating the occlusion on his models.

Lecturers will include Leo Sreeby, Max Gratzinger, Frank Wentz and Balint Orban.

Information may be obtained from the University of Illinois College of Dentistry, 808 South Wood Street, Chicago 12.

Iowa • A one-day postgraduate course on dental roentgenology will be offered January 16 at the College of Dentistry of the State University of Iowa.

The morning conferences will concern recent advances in roentgenographic technics, including a practical modification of the long-cone technic and the use of high speed films. The hazards of radiation will be discussed. The afternoon will be devoted to demonstration clinics and a practical application of the technics, in which the registrants will participate. For this purpose a roentgenographic machine will be made available to each two registrants.

The course is under the direction of George S. Easton, professor and head of the department of oral diagnosis and radiodontics; he will be assisted by several staff members of the College of Dentistry and the College of Medicine.

Inquiries may be addressed to Dr. Easton at the College of Dentistry, State University of Iowa, Iowa City.

Kansas City • Thirteen postgraduate courses will be presented either before or after the annual alumni meeting to be held March 8-9 at the University of Kansas City School of Dentistry. The courses are:

Oral surgery by Wilton Cogswell, March 1-6; oral pathology and diagnosis by H. B. G. Robinson, March 5-6; radiodontics and long-cone technic by D. T. Waggener, March 10-11; practice management by G. Archanna Morrison, March 10-11; anesthesia for office and hospital by John D. Gehrig and Wilton Noltensmeyer, March 10-13; endodontics by Carl W. Sawyer, March 10-13; high speed technics in operative dentistry by Kenneth F. Grove, March 10; full denture prosthesis by Irving R. Hardy, March 10-12; pedodontics by George Teuscher and Norman Olsen, March 10-12; fixed crown and bridge prosthesis by Stanley D. Tylman, March 10-11; precision bridgework by John Gossett, March 12-13; periodontics by Irving Glickman, March 10-11; head and neck anatomy by James E. Herbertson, March 10-13.

Information may be obtained from Joseph F. Jacobs, director of the postgraduate division, University of Kansas City, Kansas City, Mo.

Loyola (Chicago) • Thirteen refresher courses will be presented during the coming term by the Chicago College of Dental Surgery, Loyola University. They include:

Periodontics by Balint Orban, January 21-23; anesthesia by Max Sadove, January 27-29; partial dentures by Kenneth Austin, January 28-29; oral surgery by Joseph Kostrubala, January 27 and again March 22-27; immediate dentures by Emmett Beckley, January 25; pharmacology by Gustav Rapp, January 27; roentgenology by Byron May, January 28; endodontics by Edgar Coolidge, January 29; practice management by Wallace Kirby, March 3, 10 and 17; oral physiology by Gustav Rapp, March 3, 10 and 17; oral diagnosis by Patrick Toto, March 15-17; applied anatomy by Harry Sicher, April 2-4.

Information may be obtained by writing to Frank M. Wentz, director of the postgraduate division at the College, 1757 West Harrison Street, Chicago 12.

Medical College of Virginia • The following courses have been announced by the Medical College of Virginia for the winter and spring quarters of 1954:

Crown and bridge prosthesis, February 22-24; oral diagnosis and roentgenology, March 1-6; complete denture prosthesis, March 8-13; periodontics, March 8-12; pedodontics, March 15-19; exodontics and oral surgery, March 15-17; partial denture prosthesis, March 29-31; roentgenology, April 5-7; operative dentistry, April 5-7; endodontics, April 12-17; complete denture prosthesis, April 26-30.

The registration in each class will range from six to 12 students. Further information may be obtained from S. J. Kreshover, director of postgraduate and graduate instruction, Medical College of Virginia, School of Dentistry, Richmond 19, Va.

Northwestern • An introductory and refresher course on cephalometric radiography will be presented February 22-24 by the graduate department of orthodontics of Northwestern University Dental School.

The content of the course includes normal and abnormal growth of the face, evaluation of malocclusion and dentofacial disharmony, evaluation of orthodontic results, influence of facial growth on orthodontic therapy, application of cephalometric radiography to functional analysis of occlusion and normal and abnormal function of the temporomandibular joints.

A detailed manual, cephalometric roentgenograms, tracing light and all other necessary equipment are supplied.

Application for registration may be made to the dean, Northwestern University Dental School, 311 East Chicago Avenue, Chicago 11.

Ohio State • The following postgraduate dental courses will be presented from January to June 1954 by the Ohio State University College of Dentistry:

Partial denture prosthesis, January 18-22 and May 17-21 by Victor L. Steffel; full denture prosthesis, January 25-29 and May 10-14 by Carl O. Boucher; children's dentistry,

February 8-12 by Lyle S. Pettit; oral surgery, February 15-19 and April 5-9 by Morgan L. Allison; periodontics, March 1-5 and May 3-7 by John R. Wilson; endodontics, March 8-12 by J. Henry Kaiser; crown and bridge, March 29-April 2 by Frank C. Starr; general anesthesia, April 12-16 by Morgan L. Allison; anatomy of the head and neck, June 7-11 by Linden F. Edwards.

Each course is presented for five consecutive days, Monday through Friday, and enrollment is limited. Further information and application forms may be obtained from the postgraduate division, College of Dentistry, Ohio State University, Columbus 10, Ohio.

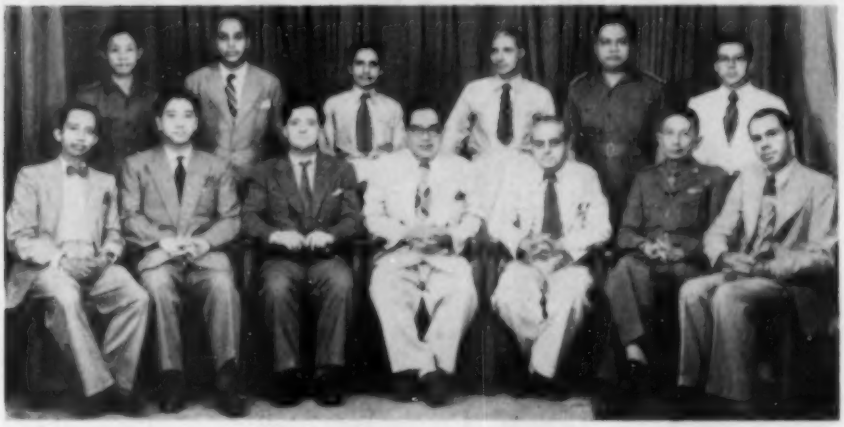
Western Reserve • An eight-week course in pedodontics will be offered at Western Reserve University School of Dentistry beginning January 7.

Under the direction of Philip Burwasser, the course will include individual instructions by Dr. Burwasser in each student's office, as well as lecture and clinic sessions. Information may be obtained from the registrar of the School of Dentistry, Western Reserve University, Cleveland 6.

Temple • Postgraduate courses which have been scheduled at Temple University School of Dentistry include a five-day course in periodontal pathology, to be presented March 1-5, and a three-day course in clinical occlusion, to be presented April 14-16. Sessions of both courses will meet 9 a.m.-5 p.m. and enrollment will be limited.

Application forms may be obtained from Louis Herman, Temple University School of Dentistry, 3223 North Broad Street, Philadelphia 40.

International



The founding members of the newly-formed Burma Dental Association are shown at a recent meeting. They are (standing, l. to r.) Lieut. Aung Thein, D. S. Ahluwalia, S. S. Mathur, R. L. Soni, Capt. Tha Win and Thomas Minn. Seated (l. to r.) are Kyee Myint, joint secretary; William Tan, vice-president; I. B. Bennet, president-elect; W. Moon Aung, president; Capt. S. Bratt, honorary general secretary; Capt. Ohn Maung, vice-president, and G. V. Thakur, treasurer.

MEXICAN DENTAL CONGRESS DRAWS INTERNATIONAL GUESTS

The second International Dental Congress of the Mexican Dental Association, held November 15-21 in Mexico City, drew 147 international guests and about 700 Mexican dentists, it has been announced by Roman S. De Lascurain, president.

Color television of surgical operations and table clinics were features of the program, as well as essays presented in 22 scientific sections. Simultaneous translations into English or Spanish were available at general assemblies.

Oren A. Oliver of Nashville, president of the Fédération Dentaire Internationale, and Harold Hillenbrand of Chicago, secretary of the American Dental Association, were honorary members of the Congress. Both addressed a general assembly. A total of 26 members of the American Dental Association participated in the Congress as clinicians or official representatives of dental groups in the United States.

The third Congress of the Mexican Dental Association will be held in 1955, it has been announced by German Sanchez Cordero, president-elect.

BELGIAN ASSOCIATION PLANS INTERNATIONAL CONGRESS

The Association of Licensed and University Dentists of Belgium is planning an International Congress of Dental Science to commemorate the 25th anniversary of the establishment of the academic degree of Licencie en Science Dentaire

Views of the closing session of the recent second International Dental Congress of the Mexican Dental Association show both the members of the Congress and the speaker's platform. Standing at the Speaker's table are Nabor Carrillo Flores, president of the National University of Mexico, and Roman S. De Lascurain, president of the Congress. Seated (l. to r.) are Erik Martinez Ross, Pablo Carter, Jesus Sarabia, Roberto Ruff—all members of the organizing committee—a guest from the American Embassy, Harold Hillenbrand, secretary of the American Dental Association, and Salvador Tercero, German Sanchez Cordero, Pedro P. Villalon, Adan Aguirre, Manuel Garrido and Antonio Fragoso, members of the organizing committee.

and the 20th anniversary of the Association.

F. Noterman of Brussels will act as president of the Congress, which will be held May 26-31 at Casino de Knocke-Albert-Plage. All information concerning the event may be obtained from Dr. Noterman at 141, Avenue Carton de Wiart, Brussels, Belgium.

General

LLOYD ROGERS ELECTED CHIEF OF DETROIT HOSPITAL

For the first time in the history of the Detroit Receiving Hospital, a dentist, Lloyd Rogers, has been elected president of the Hospital. Dr. Rogers, director of the oral surgery department, has been on the hospital staff for 34 years. He was graduated from the University of Michigan School of Dentistry in 1911 and is a member of the subcommittee on civil defense of the A.D.A. Council on Federal Dental Services.

Dr. Rogers' appointment to head a municipally-owned, general hospital is unique in the annals of American hospital administration; rarely has a dentist been appointed to the chief post of any hospital.

OFFICERS LISTED BY ACADEMY FOR CARE OF HANDICAPPED

The new officers of the Academy for Oral Rehabilitation of Handicapped Persons are Manuel M. Album of Philadelphia, president; M. Michael Cohen of Boston, president-elect, and Hugh Kopel of Detroit, secretary.

Information concerning the Academy may be obtained by writing to Dr. Kopel at 19933 Livernois Ave., Detroit.

RETIRED DENTAL RESEARCHER, TIMOTHY HARDGROVE, DIES

Timothy A. Hardgrove of Fond du Lac, Wis., prominent dental researcher and former vice-president of the Association in 1937-38, died December 15 at the age of 79.

Dr. Hardgrove, affectionately and nationally known as "Tim," was a leader in the movement to promote fluoridation of public water supplies and was recently honored by the Wisconsin State Medical Society for having "achieved singular recognition as a distinguished practitioner, an imaginative dental researcher and as a leader among men." A graduate of the Chicago College of Dental Surgery in 1901, he retired after a 50-year career.

Dr. Hardgrove held many offices in the Association, the American College of

T. A. Hardgrove

Dentists and other organizations. He was a long-time chairman of the Wisconsin State Dental Society's fluorine study committee, an Association committee chairman and an Association representative to the 1936 International Dental Congress in Vienna.

His research concerned fungus infections of the oral cavity, periodontal diseases, glandular and general systemic factors in the process of decay and the effect of fluorides on the teeth. Dr. Hardgrove was a prolific contributor to dental literature throughout his entire professional career.

COLLEGE CITES J. F. JACOBS FOR DISTINGUISHED SERVICE

Joseph F. Jacobs, assistant dean of the University of Kansas City School of Dentistry, received a citation from Central College, Fayette, Mo., November 14 at the College's centennial observance.

Dr. Jacobs, who is chairman of the dental school's periodontics department and director of its postgraduate division, was one of several alumni of Central College who were honored "for distinguished service and honor." Dr. Jacobs is the first dentist to be cited by the College.

PANEL DISCUSSION TO BENEFIT ISRAELI DENTAL SCHOOL

A seminar on complete dentures will be presented January 14 in New York in the interest of the Hebrew University School of Dentistry in Jerusalem, it has been announced by S. Daniel Seldin, chairman.

"Complete Denture Prosthesis for the General Practitioner" will be discussed by Irving R. Hardy of Tufts College Dental School, Max Pleasure of Columbia University and Bronx Veterans Administration Hospital, and James V. Giordano of the New Jersey State Board of Dental Examiners.

Raymond J. Nagle, dean of New York University College of Dentistry, will be moderator of the panel, which will be presented at 8 P.M., January 14 in the Henry Hudson Hotel, New York.

BOARD OF DENTAL SPECIALTIES ANNOUNCES NEW OFFICERS

William A. Jordan of the Minnesota Department of Health was elected president of the Advisory Board for Dental Specialties at its recent meeting in Cleveland. He succeeds Leslie M. FitzGerald of Dubuque, Iowa. Capt. A. H. Grunewald, DC, USN, of the U. S. Naval Hospital, Great Lakes, Ill., was re-elected secretary-treasurer of the Board.

UMW DENTAL CONSULTANT, PHILIP W. WOODS, DIES

Philip W. Woods, dental consultant for the Welfare and Retirement Fund of the United Mine Workers of America, died December 10 at the age of 45.

He was director of the UMW dental division in 1948 and later became a consultant to the union's Fund. Previously he had been a dental officer with the State of Maine Bureau of Health, the Farm Security Administration, the Department

Ho Quan Phuoc (left) of Saigon, Vietnam, affiliate member of the American Dental Association, is presented the affiliation charter of the Junior Chamber International from Richard Nixon (right), vice president of the United States, who visited Saigon recently.

Dr. Ho Quan Phuoc, first president of the Vietnam Jaycees, is a member of the Taberd Medical Committee and conducts a free dental clinic in Saigon slums. Formerly in charge of the Shanghai General Hospital Dental Department, Dr. Ho Quan Phuoc visited the Association's Central Office in 1950. He states that Vietnam, with a population of 20 million, has only 40 dentists.

Shown at the recent meeting of the American Society of Oral Surgeons, which was held October 21-24 in Houston, Texas, are (l. to r.) Daniel Lynch of Washington, D. C., president-elect of the American Dental Association; Miss Ruth Whalen of Richmond, Va., secretary of the Society, and Leslie M. FitzGerald of Dubuque, Iowa, president of the American Dental Association. Miss Whalen is also secretary to the dean of the Medical College of Virginia, Harry Lyons, speaker of the House of Delegates of the Association.

of Agriculture and the U. S. Public Health Service.

A graduate of the University of Michigan School of Dentistry, he held graduate degrees from Northwestern University and Harvard School of Public Health. He was a member of the Association, the A. A.A.S. and the American Public Health Association.

VETERAN WOMAN DENTIST HONORED BY DENTAL SOCIETY

Josephine Spillman of North Tonawanda, N. Y., was honored for her 55 years in dentistry at a testimonial dinner given recently by the Twin City Dental Society of New York.

Dr. Spillman, a graduate of the University of Buffalo School of Dentistry in 1898, received gifts and tributes from both her local and district dental societies. She is a life member of the American Dental Association.

MICHIGAN PEDODONTISTS TO PRESENT ALL-DAY CLINIC

An all-day clinic will be the outstanding feature of the third annual meeting of the Michigan Society of Dentistry for Children, to be held February 3 with a joint observance of Children's Dental Health Day.

The clinic, to be held at the Veterans' Memorial Building in Detroit, will be sponsored by the Detroit District Dental Society. Featured speakers will include Leonard Fosdick of Chicago, Paul Sydow of Framington, Mass., and Myron Kaufman of Detroit. The program is open to all interested dentists.

NORTHWESTERN DENTAL ALUMNI TO MEET AT LUNCHEON

The Northwestern University Dental Alumni Association will hold its annual luncheon during the Midwinter Meeting of the Chicago Dental Society February 10 in the Conrad Hilton Hotel, Chicago. Arne Romnes, president of the organization, will preside. George W. Teuscher, dean of Northwestern University Dental School, will speak on "Dental Education at Northwestern."

The Northwestern Alumni Association also has arranged to serve coffee and doughnuts to alumni visiting the Northwestern Room, 557A. Tickets for the luncheon will be on sale in the room; seats will be reserved at class tables.

GENERAL ANESTHESIA SOCIETY TO DISCUSS RESPIRATION

A lecture and discussion on "Respiratory Sounds During Inhalation and Intravenous Anesthesia" will compose the scientific session of the spring meeting of the American Society for the Advancement of General Anesthesia in Dentistry, to be held March 22 at the Shelburne Hotel, New York.

The speaker will be Milton S. Travin of Brooklyn, associate visiting dental surgeon of Gouverneur Hospital, New York City. Admission to the meeting may be obtained on application to the executive secretary, M. Hillel Feldman, 730 Fifth Avenue, New York 19.

PLAN CONFERENCES TO STUDY INSTITUTIONAL CARE OF AGED

Improving institutional care for the aging will be the subject of a series of regional conferences during the coming months as representatives of health and welfare authorities in the 48 states meet under the auspices of the National Committee on Aging of the National Social Welfare Assembly, New York.

Financed by the Frederick and Amelia Schimper Foundation, the conferences will discuss experiences in the field of standard-setting and licensure of institutions caring for elderly people. The conferences will also discuss the findings of the recent two-year study of basic standards for this field, which was conducted by the same Foundation.

In preparation for the regional conferences, the committee has invited dentists who are concerned with institutional care of the aging to send information or reports relating to their activities in improving standards to National Social Welfare Assembly, Inc., 345 East 46th Street, New York 17.

REHABILITATION GROUP PLANS PANEL ON CLEFT LIP, PALATE

A panel discussion by staff members of Northwestern University Cleft Lip and Palate Institute will be featured at the second annual convention of the National Association for Somatoprosthetics and Rehabilitation, which will meet February 4-7 at the Conrad Hilton and Congress Hotels, Chicago.

"Group Management of Cleft Lip and Palate Rehabilitation" will be discussed by F. W. Merrifield, Walter W. Dalitsch, John R. Thompson, T. M. Graber, Harold Westlake and Morton S. Rosen on the afternoon of February 4.

Limited attendance clinics scheduled for February 5 will include maxillofacial prosthesis by A. H. Bulbulian of Rochester, Minn., and artificial acrylic eye construction by Lt. Col. S. F. Smolczynski of Brooke Army Hospital. A paper on rehabilitation problems in tumor surgery of the jaws will be presented by Orion H. Stuteville of Evanston, Ill.

Also . . . In Perth Amboy, N. J., citizens voted to adopt fluoridation by an overwhelming margin. Perth Amboy has a population of 45,000. . . . The tenth Post College Assembly of the Ohio State University College of Dentistry will be held April 21-22. Programs and reservation cards will be mailed to alumni; other dentists may obtain information and reservations by writing to the College. . . . The Horace Wells Club held its 59th annual dinner December 12 in Hartford, Conn., to honor the memory of Horace Wells and to commemorate his discovery of anesthesia. . . . Columbia University's dental alumni organization will hold its annual dean's day February 26 at the Dental School. The program will include a scientific session by the New York Study Group, a luncheon with a prominent speaker and the first presentation of the Dental Research Award Medal. . . . A new publication, *Journal of the Western Society of Periodontia*, will be devoted to abstracts of articles on periodontics which may appear in any of 163 American and foreign journals.

International Correspondence

NEWS FROM AUSTRALIA

The great value of Senator Fulbright's plan for the dissemination of knowledge and the promotion of good will has been vividly demonstrated by the recent visit of Basil Bibby to Australia.

Under the auspices of the Australian Dental Association and the United States Educational Foundation in Australia, Dr. Bibby, who had undertaken a lengthy visit to his homeland, New Zealand, most generously agreed to extend his itinerary to include Australia.

His visit could not have been more opportune.

His extensive experience and his American and international reputation insured that his words in the many discussions, press statements and broadcasts bore the stamp of authority.

His visit met the need for an authoritative statement on the merits of preventive procedures currently utilized in the United States, as it has become extremely important that the profession, appropriate governmental institutions and the public be informed about such matters as fluoridation.

Also, the profession, severally and as a whole, had the opportunity of receiving a highly desirable stimulus, administered in a most pleasant and yet forthright manner.

The interest created at three lectures delivered in Sydney was ample evidence of this. These lectures embraced the fields of dental caries and periodontics. A fourth lecture—an informal talk on trends in research—proved to be a delightful exposition of the philosophy guiding the development of the Eastman Dental Dispensary, as well as a brief survey of a few projects currently under investigation in the United States.

One readily appreciated the work of the Eastman Dental Dispensary and the reason for its well merited reputation.

In addition to the Sydney lectures, series were included for Melbourne, Brisbane and Newcastle. The significance of Dr. Bibby's visit to Newcastle is the imminent possibility of a fluoridation project there.

Of great importance also were the discussions Dr. Bibby held in Canberra with the Honorable Minister for Health, the Director-General of Health, officers of the federal Department of Health and leaders of the Opposition.

This last series will be appreciated particularly by those who have been faced with the task of guiding and influencing government instrumentalities in the intricacies of public dental health problems.

The Australian Dental Association had formulated in 1947, at the request of the Government of the day, careful plans for the establishment of a dental service. Developed in the light of knowledge current at that time, the principles were designed to provide service for the younger age groups and specific services for those people living in sparsely populated areas of the remote zones of Australia.

Although the rural problem may remain for many years, children's dental health must be improved as knowledge of current preventive and control programs becomes more widespread and can be applied in this country.

It seems, therefore, that although the delay in implementing any public dental health program has been a regrettable and costly omission from the Government's health measures, it may enable the Association to press forward its claims for the more valuable and desirable procedure of fluoridation, together with public education in dental health.

The National Health and Medical Research Council has approved the principle of fluoridation of community drinking waters as a means of partial control of dental caries.

Opposition to the fluoridation technic has been voiced by a numerically small, but vociferous and influential, section of the dental profession which has complicated the task of promoting fluoridation here.

Readers will therefore appreciate, I hope, why the Association has seized upon the presence of Basil Bibby to strengthen its representations and give authoritative support to its fluoridation campaign in which both press and radio have been extremely cooperative, and why this news letter contains so much about the visit of Basil Bibby.

Dr. Bibby's final official task in Australia was an address to the Public Health Committee of the National Health and Medical Research Council. Of him it may be truly said that he is a thoroughgoing peripatetic professor and an excellent ambassador for the American dental profession and the Eastman Dental Dispensary.

REPATRIATION DENTAL SERVICE

This service has lately developed in order to provide adequate dental care for former servicemen and servicewomen. It will, it is hoped,

insure a well organized service in which the private practitioner may readily participate.

Briefly, it is designed to provide dental services to the veterans who have disabilities to the mouth and jaws arising from war service or who have other disabilities which are service-connected and which require dental treatment as part of over-all treatment.

In addition, dental care will be provided in these categories: (1) all personnel with 100 per cent pensions or with partial pensions in special instances, and (2) widows and dependents of veterans whose death has been accepted as connected with war service.

The scheme operates largely through the service of local panels of cooperating dentists and insures a special scale of fees for appropriate services. It will be under the control of the Repatriation Commission and a senior visiting dental officer in each state will act as consultant and adviser to the senior medical officer.

The program is in its initial stages. Time will enable a more critical estimate of its efficacy.

Robert Harris, United Dental Hospital, Sydney

NEWS FROM GREAT BRITAIN

As this letter will be read in the first issue of a New Year, it seems right to begin with some notes on future progress. Professor Martin Rushton writes of current research and its progress in Great Britain.

Dental Research • A representative sample of dental research projects, either completed or in progress, in Great Britain is presented in the report of the first meeting of the British section of the International Association for Dental Research, recently published in the *Journal of Dental Research* (October 1953). The 17 papers include several tissue culture studies of dental tissues, as well as investigations of enamel, dentin and saliva by physical, chemical and histological methods.

The Ministry of Health and the Ministry of Education are still continuing a large-scale survey on the results of applying fluoride solutions to the teeth of children, and results are not yet available. It is hoped that before long it will be possible to decide whether this method of reducing caries experience affects British children sufficiently to justify the organization of a service of this sort.

Research by E. O. Morris in the bacteriology of the oral cavity is being published in a series of articles in the *British Dental Journal*. This worker's plan has been to study exhaustively the total flora in a few mouths rather than a few organisms in many mouths. The first section published deals with the distribution of bacteria in and on the enamel.

Other recent research articles in the *British Dental Journal* concern the *in vitro* sensitivity of organisms isolated from root canals, the buffering capacity of saliva and the presence in carious dentin of aspartic, glutamic and lactic acids.

The Dental Board • E. Wilfred Fish writes that the Dental Board of the United Kingdom has just held its autumn session for general and disciplinary business. In the 32 years since the Board came into existence, only once or twice has the General Medical Council failed to act on the Board's recommendations in disciplinary cases. This time, however, Council members have refused to strike from the Register a dental practitioner convicted of an offense for which he has been imprisoned, even though the Dental Board believed this should disqualify him for the practice of dentistry.

The new Dentist's Bill to Amend the 1921 Act, which so nearly became law in 1952, provides for a new General Dental Council to supersede the Dental Board and take the whole responsibility in disciplinary measures. It is possible that this bill may be reintroduced in this present session of Parliament.

Meanwhile, the Dental Board has other functions, including the collection of a "retention fee" (at present £2.10.0 a year) from dentists whose names appear on the Register. After defraying expenses, the Board members may devote the surplus funds to any public matter related to dentistry. Among other things they have decided this year to offer traveling scholarships to men and women engaged in research or postgraduate study, to enable them to go abroad and make professional contacts which seem likely to be of benefit to their work and through them to the public.

British Dental Association • W. Stewart Ross notes that much of the news of the B.D.A. concerns the Minister of Health. Since the beginning of the National Health Scheme it has been no secret that relations between the British Dental Association and the Ministry of Health have been strained. It is, therefore, a source of satisfaction that the Minister of Health, Iain Macleod, has accepted an invitation to have lunch with members of the Council of the British Dental Association. Although the meeting will be informal, it may mark the beginning of friendlier relations between the profession and the Ministry.

The Minister of Health was asked in Parliament last week what action he proposes to take regarding the recommendations of the United Kingdom Mission to North America, which studied fluoridation as a means of controlling dental caries. In reply Mr. Macleod said that the Government had decided to accept the recommendations of the Mission and that studies will be made in selected communities of the various aspects of fluoridation before considering whether it should be adopted generally in this country.

In conclusion he stated that local authorities will be invited to cooperate in these studies. The British Dental Association has already advised an immediate investigation into the question of fluoridation.

The British Dental Association has noted with regret that, as the experimental training of oral hygienists initiated by the Ministry of Health has ended, there are now no facilities for the training of such personnel. At present it is illegal for private practitioners to employ oral hygienists in their practices; they may only be employed by local authorities in the School Dental Service.

Public Dental Services • John W. Gilbert sends information on the Hospital Dental Service, which is quite separate from the General Dental Service. Personnel in the Hospital Dental Service consist of consultants, senior hospital dental officers and registrars. At the outset of the National Health Service in 1948, practitioners who held hospital posts were graded into various categories of hospital officer. It was only to be expected that the greater proportion of those appointed to the highest grade (consultants) should be of mature years; this also applied to a lesser degree to the next level, senior hospital dental officers.

Concern is now arising that there may develop a serious shortage of hospital officers of consultant rank because so many will be reaching retirement age at the same period. There appears to be an insufficient number of officers in lower grades available or sufficiently experienced to fill the numerous vacancies likely to occur. As the National Health Service develops further attention must be given to insure a steady and adequate promotion of dental hospital officers right up from the lowest to the highest without bottlenecks or scarcities.

Negotiations regarding remuneration and conditions of service for many of the personnel employed in the National Health Service are determined by agreement between the management and staff sides at Whitley Councils specially established to provide for the differing types of Health Service employees.

In general the individual Councils fulfill satisfactorily the duties they are intended to perform. Not only dental, but numerous other professions are involved in the negotiations and decisions. Inherent within the conception of Whitley machinery is the provision of some means for arbitration whenever there is a failure to agree between the management and staff sides of a Whitley Council. These differences are not frequent but do occur and attempts are now being made by the British Dental Association, British Medical Association, Royal College of Nursing and other associations representing physiotherapists, radiographers, psychiatric social workers and others to secure agreement on the provision of a satisfactory formula for arbitration at the Whitley Councils.

Items of General Interest • News has gone round the world of the contention by the British Museum authorities that the Piltdown Skull discovered by Dawson in 1912 is in fact not genuine. The section of the mandible and the canine tooth are considered to be that of an ape of fairly recent origin.

It is of interest to recall that Alvan T. Marston, dental surgeon and archeologist, prominent for his discovery of the Swanscombe Skull, wrote a paper in the *British Dental Journal* in 1936 claiming that although the vault of the Piltdown Skull was human, the mandible was that of a chimpanzee. In casual communication given before the odontological section of the Royal Society of Medicine on last November 23, Dr. Marston showed a section of the canine tooth with sand granules in the root and a fossiled stone closing the apex—evidence in Dr. Marston's opinion of the very great age of the tooth.

The Metropolitan (London) Branch of the British Dental Association has lately held its annual clinical meeting and it may be of interest to readers in the United States to know that among the clinicians were Lt. Col. S. L. Monaco and Lt. Col. N. S. Sothras of the U. S. Air Force Dental Service, now stationed in Great Britain.

It is a great pleasure to see the close liaison which exists between service dental officers from the United States and the members of the British dental profession. The willingness of these officers to share their knowledge and join in our activities is very much appreciated. The many friendships which are being made can only help to further that understanding between the members of the dental profession of our two countries which is essential to future progress.

G. H. Leatherman, D.M.D., F.D.S.R.C.S.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

WASTAGE OF DENTAL MANPOWER

At the present time it is the policy of the Armed Forces to dip into the dental and medical professions for as many men as they see fit. They use these dentists and physicians with an inefficiency which is appalling. The situation would be a serious one if we had a plentiful supply of dental and medical personnel, but in the face of the critical shortage which exists, it is imperative that this squandering be stopped at once.

In years gone by the health professions could supply the limited needs of the military without jeopardizing the health of the civilian population. Today it would be difficult, if not impossible, to supply the full needs of the enlarged military services without causing a critical shortage at home. Not satisfied with this tremendous problem, the Armed Forces offer to care for the dependents of our servicemen as well. For this reason, I believe, several points must be included in any final plan which the profession may draw up to solve the dental manpower problem.

1. The Armed Forces must cease giving dental care to dependents in the United States.

2. Only emergency care should be offered to dependents overseas. All dependents should be instructed to have their dental treatment completed before leaving the United States.

3. The Veterans Administration outpatient dental program should include treatment of military recruits prior to their induction.

4. The average inductee would then require only a minimum of dental maintenance work and in many cases no further treatment would be necessary while the man was on active duty.

5. Every effort should be made to use civilian contract dentists whenever possible.

These changes in the military dental program would have the following advantages over the method now in use:

1. The expensive equipment and buildings now required by the military dental departments could be reduced.

2. The expensive training of dentists and auxiliary personnel would also be cut to a minimum.

3. The expense of shipping supplies and equipment to overseas stations would be minimized.

4. The expense of shipping dental personnel, their families and their household goods to various stations would be reduced, as well as expenses of providing housing, schools and medical care for dentists' families.

5. The recruit would be allowed to select his own dentist and have his treatment accomplished before his basic training.

6. It is safe to assume that the dentist working on a fee basis gives the government more for each dollar than the man on a salary.

7. Such a program would make it unnecessary to disrupt the lives of so many families by calling established practitioners to active duty. By the same token communities would not be left with insufficient dental personnel.

The future of our profession as we know it rests squarely on the shoulders of each dentist. We can expect no help from the administrators of the military dental program, as such a progressive change would destroy the empire which they have built. We, as a well organized professional society, must see that proper legislation is enacted. We must not rest until we are assured that our lives will no longer be squandered by a department which is not operating with the efficiency which we have a right to demand of it.

Collins Carpenter, D.D.S., Canandaigua, New York

Book Reviews

HISTOLOGY

By Arthur Worth Ham. Second edition. 866 pages with 518 illustrations and 7 plates in color. Index. Price $10. Philadelphia, J. B. Lippincott Company, 1953.

Practically every chapter in this edition has been altered, although in some instances the changes have been of a minor nature. The most elaborate changes occur in the chapters on bone, muscular tissue, nervous tissue and kidney. In other chapters extensive changes have been confined to parts of a chapter, such as those on the liver, the pituitary gland and the adrenal. Elsewhere, changes are more limited.

The author has written a book complete in detail, clearly expressed and interesting. Although this book is devoted to histology, sufficient information on physiology and chemistry has been introduced to make it vital. Incidents taken from the everyday pattern of life have been used in an effort to express a pertinent item simply. These incidents have been effectively used and their simplicity makes them easy to understand.

Doctor Ham has used letters for abbreviations of substances and technics. In introducing these letters as part of the text he states that the terms for which they stand have been in such extensive use that he feels justified in the use of the letter abbreviations. His statement we must accept, but we must realize that this textbook is for beginning students whose frailities we know; hence, the reviewer suggests that the term or terms be referred to intermittently by name in conjunction with abbreviations.

The expansive bibliography deserves complimentary note. Special reference has been made wherever anything important is to be found within the reference listed. To the student this should prove a great boon.

The book contains new technics as well as digests of research studies that apply to histochemistry and physiology. The findings of those working with the electron microscope have been included in their respective sections of endeavor.

Eighty new photomicrographs, two radioautographs and two color plates have been added to the already well-illustrated book. Included in this edition are a number of pictures made with the electron microscope. The photomicrographs used are excellent, for they are clear and sharp of detail. Another feature of note is the abundant use of photomicrographs in contrast to the minimum number of artist-made drawings. The diagrams which are used are splendid for they convey to the reader that which students so often consider complicated or fail to understand at all. At the beginning of the text two diagrams on sectioning will be very helpful to the student in orientation of slide material at the beginning of the course.

This edition is greatly expanded in content, but despite this increase the price remains the same.

J. R. Schumaker

THE SUCCESSFUL PRACTICE OF DENTISTRY

By S. Joseph Bregstein. 400 pages. Index. Price $5.35. New York, Prentice-Hall, Inc., 1953.

In his preface the author states that since 1929 when his first book, *The Business Conduct of an Ethical Practice*, was published, the demand for additional work on this subject has expanded. Changing ideas and more advanced understanding of the basic principles of an ethical practice have suggested to him the need of a complete modern treatment. In his latest work the material presented has been prepared with a view toward providing an adequate system for all types of practices. The fundamental principles are essential. Suggestions are also given to be tempered by the dentist's own good judgment which will be helpful in adapting proposed procedures to the individual's requirements. It is not too much to state that the book preeminently fills the need for a modern treatment.

The book is written in clear comprehensive style, and throughout one is impressed with its simplicity and effectiveness. The author engages the interest of the practicing dentist, as well as the undergraduate, at the very outset. Much is to be gained by a careful perusal of its many and varied topics. The text is divided into eighteen chapters, giving consideration to all the business aspects of the profession. The chapters are further subdivided to incorporate various titled paragraphs related to the captioned chapters.

The author confines himself to the description of handling cases which may occur in the

practice of the average dentist. He simply outlines his own method of dealing with these conditions as they are presented. Yet, there are some original methods described which are not generally known or practiced and which may have considerable merit. The book is replete with practical suggestions which add considerably to its value. This reviewer can safely recommend it as an effective, concise presentation of the subject.

Doctor Bregstein is to be congratulated upon giving us once more a valuable contribution to our literature, and the publisher for presenting the text in such good style.

E. Alan Lieban

ESSENTIALS OF PHYSIOLOGICAL CHEMISTRY

By Arthur K. Anderson. Fourth edition. 480 pages. Index. Price $5. New York, John Wiley & Sons, 1953.

This well-known textbook of biochemistry has been brought up to date by the inclusion of recent advances in carbohydrate metabolism, enzymes, isotopes, chemotherapy, vitamins and photosynthesis. The chapter on biophysical chemistry is sketchy in certain portions, but the salient features of this expanding phase of biochemistry are covered. The review questions at the end of each chapter will be helpful to the undergraduate and to the student reviewing biochemistry for various board examinations.

The book is written in a clear concise style and continues as a valuable text for courses in the premedical and predental curricula.

J. C. Calandra

THE CONCEPTION OF DISEASE

By Walther Riese. 120 pages. Index. Price $3.75. New York, Philosophical Library, 1953.

A concept cannot be made the subject of a tale; it has to be analyzed. Though disease is a basic experience of human existence, each stage of civilization has its own concept of disease. It would not be possible to write the history of the various concepts of disease from the most primitive and crudest ideas of magic to the most refined and elaborate concept of modern psychology.

In fact, the various concepts of disease have always been overlapping, living side-by-side at each stage of human history, and the road from primitive to rational thought has to be sought and rediscovered anew by each generation and each individual. Nor is any generation or any individual protected against the danger of relapsing into early concepts, once the final stage is reached. At every moment of his history man has to rewrite the history of mankind.

Thus emerges the plan of the history of omnipresent ideas rather than that of events and discoveries happening but once. However, a given concept of disease often arises with greater power at a given moment of human history and is shaped with greater strength by an outstanding figure of medical history. This fact sets a limit to the effort of tracing the history of medical doctrines as a movement of thought rather than of men and happenings.

Therefore, whenever possible, the author has traced the various concepts of disease back to their historical sources, analyzing the original and first conscious versions, going back to them, if needed, but also anticipating them, according to the laws of reason which do not coincide with the laws of history.

I. Newton Kugelmass, M.D.

YOUR COMMUNITY'S HEALTH

By Dean Smiley and Adrian G. Gould. 454 pages with 92 illustrations and 29 charts. Index. Price $5.50. New York, Macmillan Co., 1952.

This is a book to be read both for pleasure and information. Divided into the categories of environmental sanitation, communicable disease control, epidemiology and care of the chronically ill, it is so interestingly written that the lay person or student may find it a valuable reference book. After presenting sufficient historical background to point up the accomplishments and needs in public health, it completes its mission by showing what can be done to meet those needs. We would unqualifiedly recommend this book as a supplementary reader in any course of orientation in public health at the college level, and as a reference book to all lay community health organizations.

Every dentist would do well to read this book for a broadening of his own background that he may be better fitted to take his place as an informed individual in his community activities. The dental profession, through the programs of fluoridation of public water supplies, has awakened to activities beyond the limits of the oral cavity; it is especially important that we all know more about the problems and methods of public health.

H. Shirley Dwyer

PROTESIS A PLACA

By Pedro Saizar. Fifth edition. 1,061 pages with 1,345 illustrations. Index. Price $10. Buenos Aires, Progrental Editor, 1953.

This is a comprehensive and authoritative work on complete and partial dentures which has had the largest sale of the dental books written in the Spanish language.

It is not easy to give an adequate idea of the tremendous influence that this book has had on the development of prosthodontics in Latin America and Europe during the past 20 years. Before this book was published, studies on prosthetic dentistry evolved very slowly in Argentina. Very little work in the modern sense had been done with Hanau's principles, anatomical articulators or design of partial dentures.

Since the publication of the first edition in 1933, this book has been considered a major contribution to prosthetic dentistry. Each of the five editions has been a real milestone in the evolution of prosthodontics. The author is recognized as a leading specialist in the field.

The work treats three fundamental aspects of prosthodontics: basic theory, materials and appliances and technics. The author approaches the practical problems directly, explaining the theory when necessary and proceeding from the simple to the complex whenever possible. One recognizes that the writer has complied with the precept of Bacon quoted in the preface: "Experiments which are not based on theory are blind, but theory which is not supported by experience is unreliable and even misleading."

The work, as a whole and in detail, reveals the vast knowledge and mature thought of the writer. In evaluations of technics, the author evidences critical ability. Controversial points are clearly presented. The style is clear, concise and simple.

The work, consisting of 83 chapters, is divided into seven parts as follows: impressions and materials, intermaxillary relations and articulators, artificial teeth, retention and design of partial dentures, denture bases, insertion and care, prosthetic services. In an appendix the history of dentistry is covered briefly.

From the point of view of original research, two chapters in particular deserve special mention: Chapter 6, "Anatomy of The Edentulous Jaws," and Chapter 81, "The Organism and Its Accommodation to Artificial Dentures."

At the end of each chapter a well selected bibliography of world-wide scope adds to the authority of the book. The text is complemented by 1,345 illustrations. An index of authors and subjects makes the content readily available.

It is to be regretted that this magnificent work is not available in English, since it would be of great interest to dentists in North America. This work represents an outstanding accomplishment in the dental field which honors Argentine dentistry.

Margarita Muruzábal

DENTISTRY IN ANCIENT INDIA

By K. M. Choksey. 87 pages with 12 illustrations. Index. Price $1.50. Bombay, Popular Book Depot, 1953.

The object of this booklet is two-fold: first, to validate previous claims that dental knowledge in ancient India was eminent, scientific and praiseworthy; secondly, to induce dental historians to accord India more recognition than they have done in the past. In his efforts to re-create the historical evidence, the author seems quite creative.

He refers to primitive dental knowledge as "this ancient science" (p. 78). Whereas the theory of focal infection came into being in the West in 1910, it "was known to the Hindu doctors of great antiquity" (p. 39). The Indian surgeons "knew the anesthetic called 'Sammohini.' Inhalations of the fumes of burning hemp was the anesthetic used for dental operations at a remote antiquity. The operation was carried out painlessly" (p. 65). Loose usage of terms and undated antiquity, be it remote or great, do not convince.

Choksey relates that from the 14th to the 17th century "we find records of gold, jade and diamond inlays being inserted . . . [and] gold fillings on the labial surfaces of the upper central incisors were and are still inserted as a sort of caste mark" (p. 74). The evidence needs more scholarly documentation.

The Indian dental art flourished, the author says, until the Islamic invasion "brought in a foreign school of medicine. . . . Later the English appeared with a preconceived notion of the superiority of their civilization" and created in the Indians an inferiority complex. "Dentistry also received a fatal blow." The Arabs and the English may be blamed for many things, but to blame them also for the decline of Indian dental art seems far-fetched.

India may have a legitimate claim to early dental knowledge, but when its case is poorly presented and overstated, it becomes unconvincing.

E. S. Khalifah

Current Literature

TREATMENT OF RECURRENT HERPES SIMPLEX

J. M. Borda and R. Esquivel. Prensa méd. argent. 40:142 Jan. 16, 1953.

In a case of recurrent genital herpes simplex, satisfactory results were obtained with Yaoi's antirabic vaccine. The vaccine is prepared by inactivating and preserving the rabies virus by means of sodium ethylmercurothiosalicylate.

In a second case, a 19 year old woman had had recurrent herpes simplex since childhood. From the time the patient was 12 years old until she was 18, clusters of herpes simplex vesicles appeared every three or four months. During infancy vaccination against smallpox produced a reaction but failed to show a response when the patient was 18 years of age. Such preparations as vitamins, arsenic and aureomycin had no effect on the disease. The administration of Yaoi's antirabic vaccine in daily doses of 0.2 cc. in the deltoid region for ten consecutive days seemed to meet with some success. The disease seems to be under complete control, but the period of eight months since discontinuation of the treatment is too short to permit definite conclusions.

K. Tessler

MYOBLASTOMA OF THE TONGUE

James E. Chipps and George R. Reinhardt. U. S. Armed Forces M. J. 4:925 June 1953.

A slightly elevated mass 1.3 cm. in diameter was observed along the mid-border of the tongue of a 22 year old man. The lesion had been first noted three months earlier, but there had been no evidence of an increase in size. The surface had broken down and healed uneventfully two weeks before the visit. The lesion was circumscribed, and the surface was slightly cauliflowered and yellow. The lesion was firm and extended into the tongue to a depth of about 1 cm. The mandibular first molar adjacent to the lesion had been extracted three years earlier; and the lesion, when the tongue lay at rest, was immediately adajacent to the edentulous space. There was no conscious trauma of any nature.

A wedge-shaped incision was made, and the lesion and a portion of the normal tissue were excised. No positive diagnosis could be obtained from a frozen section, but the pathologist considered it safe to rule out an epithelial malignancy. By means of a stained section, a diagnosis of benign myoblastoma was made. The section showed an irregular hyperplasia of the mucosa with a loss of detail but no break in continuity of the basal layer. Under the mucosa was a tumorous growth of large, round, granular cells mixed with occasional elongated, striated cells and a few muscle fibers. Muscle fibers were more numerous near the periphery of the mass and gradually blended with the adjacent normal bundles of striated muscle.

In this case, the proximity of the lesion to the space created by a previous extraction and an associated malocclusion are compatible with a theory of traumatic etiology. The breaking down or "ulceration" probably signified fresh trauma.

Bruce L. Douglas

PSORIASIS GINGIVAE

H. A. Brayshaw and Balint Orban. J. Periodont. 24:156 July 1953.

Three cases of psoriasis gingivae were observed clinically and identified histologically. Lesions of the oral mucosa have been described in the literature of this skin disease of chronic inflammatory nature and unknown etiology, but lesions of the gingiva have not been reported previously.

Clinically, the lesions of all three cases appeared as small plaques. The lesion in the first case was bilaterally symmetrical. The surface in all these cases was irregular, covered by small, silvery scales. Tiny bleeding points appeared when the surface was scraped lightly with a dull instrument. There were no subjective symptoms, other than a vague, itchy feeling.

Histopathologically, psoriasis was found to be characterized by: (1) parakeratosis, (2) elongation—clubbing and lacy fusion of the epithelial ridges and pegs, (3) thinning of the suprapapillary part of the epithelium so that often only a parakeratotic layer covers the papilla, (4) widening of the tip of the connective tissue papillae because of inflammation, widening of the capillaries and edema, (5) presence of microabscesses located in the parakeratotic layer of the epithelium.

BONE CHANGES ASSOCIATED WITH TOOTH MOVEMENT. A RADIOGRAPHIC STUDY

Elsdon Storey. Australian J. Den. 57:57 April 1953.

Experiments over a period of 84 days showed that there is an optimum range of force which produces a maximum rate of tooth movement. When forces either above or below the optimum range are used, the rate of movement decreases. When forces are below the optimum range, bone is laid down on the tension and pressure sides concomitantly with the movement of the tooth. When forces are within the optimum range, the formation of bone on the tension side can still be detected with the trabeculae being orientated in the direction of the applied forces. This behaviour suggests that the periodontal membrane and the bone on the tension side are still supporting some of the force applied to the tooth and hence that they influence the degree of pressure between the tooth and the bone on the pressure side.

Behind the newly formed bone on the tension side is a region of resorption where spongy bone is eventually formed and results in the reconstruction of the region. Ahead of the region of resorption on the pressure side is a region where the lamina dura is being continually reformed. There are, therefore, four recognizable phases of activity around a tooth being moved with light forces—on the pressure side resorption then deposition and on the tension side deposition then resorption.

When the forces are in excess of the optimum range, movement of the tooth practically ceases until "undermining resorption" is complete on the pressure side and movement can take place, while resorption of bone occurs on the tension side at the alveolar crest.

There is a significant difference in the appearance of the bone laid down on the tension side after the application of different degrees of force. With light forces, the bone is dense, and the trabeculae are orientated in the direction of the applied force; with heavy forces, the bone laid down is less dense and can be differentiated from the lamina dura, furthermore, the trabeculae are not orientated in the direction of the applied force.

It is interesting to compare the different reactions to similar forces of two patients, a man and a woman, of similar ages. The movement in the man was almost continuous, and bone was formed in long trabeculae on the tension side. In the woman, movement was intermittent; dense bone was laid down only during periods of relative cessation of movement. The tooth did not at any time appear to come into contact with bone on the pressure side, and there was a continuous formation of the lamina dura. This observation seems to indicate that the cyclic movement was not due to intermittent "undermining resorption." Movement initiated a week later on the opposite side of the mouth also was intermittent in character. The cycles of movement coincided in time with those on the other side, even though it might be expected that they would be one week out of phase. This observation would seem to indicate that there is some general physiological factor influencing the time at which movement takes place.

As the periodontal membrane and the bone are normally in a state of continual removal and replacement, any interference with the formation of bone or periodontal membrane could cause a reduced tolerance to mechanical stress, resulting in a variation of tissue response to the same force in different patients and even within the same patient. With this experimental method it has been possible to evaluate the extent of this variation and the influence of factors such as age, health and sex. The results have not yet been reported.

MALOCCLUSION AND ITS EFFECTS UPON ORAL MEMBRANES

M. T. Van Studdiford. Arch. Dermat. & Syph. 67:546 June 1953.

Throughout life the lips, buccal mucous membranes and the tongue are subject to constant movement, friction and irritation. These tissues must therefore possess elasticity. This elasticity varies with age. As a result, compensation for injuries and distortions varies in proportion, and as aging progresses, the ability of the tissues to provide compensation diminishes. Injuries to the tissues are better tolerated in childhood than in adulthood.

The bone and soft tissue of the oral cavity are constantly undergoing change. Anyone examining the mouth should be cognizant of the normal and pathological changes in the lips, the buccal mucous membranes, the teeth and the tongue.

Malocclusion is closely associated with oral disorders. Conditions such as open bite, closed bite, Class II and Class III malocclusions affect the oral tissues. The wearing of dentures with its many complications, sharp or fractured teeth, exposure of lips to active rays, effects of the use of irritants such as snuff and tobacco, and electromagnetic irritations, are interrelated with malocclusion.

K. Tessler

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AN IMPROVED TECHNIC FOR ROENTGENOGRAPHIC EXAMINATION OF THE TEMPOROMANDIBULAR JOINT AND CONDYLE

Ronald Grant and Harry Lanting, p. 95.

A roentgenographic demonstration of the mediolateral diameter of the condyle of the mandible, when pathologic changes are suspected, enables the surgeon to predetermine the exact extent of change before recommending therapy. Although the lateral projection is important and should be a routine procedure in examination of the temporomandibular joint, the authors were interested in evolving a technic that would demonstrate the mediolateral diameter of the condyle. The technic developed is referred to as the orbitoramus view. The orbitoramus view has proved a useful adjunct in the roentgenographic examination of the temporomandibular joint and its components, for it allows adequate visualization of the mediolateral appearance of the condyle and the major portion of the neck. A simplified technic has been developed which can be used easily with the average medical x-ray machine.

TREATMENT OF OLD DEPRESSED FRACTURES OF THE ZYGOMA

G. Kenneth Lewis, p. 101.

Correction of fractures of the zygoma with impairment of mandibular excursion has for its purpose restoration of normal function of the mandible and the eye and restoration of the normal contour of the face. Failure to reduce such a fracture, which obstructs the excursion of the mandible by impingement of the coronoid process against the depressed zygoma, results in permanent inability to open the mouth. Refracturing of the depressed zygoma and attempted repositioning usually accomplish little in the way of improvement. A different method of approach is to accept the depression as it has solidified and restore the facial contour with either rib cartilage or cancellous bone. The diplopia resulting from the downward displacement of the level of the eyeball is corrected by the implantation of rib cartilage or bone graft along the floor of the orbit. The mechanical obstruction to excursion of the jaw is then relieved by excision of the coronoid process. Release of the mandible has been immediate in all patients, and follow-up examinations have revealed no further difficulty.

PREOPERATIVE MANAGEMENT OF THE ORAL SURGERY PATIENT

Philip M. Northrop, p. 105.

Oral surgeons are constantly treating people who are suffering from disturbances that make them poor, or even dangerous, surgical risks. It is an obligation of the oral surgeon not only to operate skillfully on each patient but to manage him properly before and after as well as during surgery, to recognize and treat the individual who needs special management and to cooperate intelligently with the physician in serving surgical patients more safely and effectively.

The importance of establishing an accurate diagnosis preoperatively cannot be overemphasized. Usually a few well-directed questions suffice to discover whether the patient is a good operative risk. It is not the prerogative of the dentist to make a medical diagnosis. It is his responsibility, however, to take a case history that is of sufficient accuracy to establish the need for medical consultation.

Patients with angina pectoris or coronary thrombosis are a bad operative risk, especially if the disease is acute. Surgery should be delayed if possible; all supportive care available should be instituted.

The preoperative use of sedatives is highly recommended for all patients with cardiac disease. The barbiturates are the drugs of choice not only for the hospital patient but also for the ambulatory office patient. Intravenous administration of pentobarbital is extremely convenient and satisfactory. If pain is produced during surgery, a dangerous or even a fatal outcome may be precipitated. Therefore it is essential for the surgeon to procure a profound anesthesia. It is known that epinephrine may precipitate anginal pain because of its vasoconstrictive action. The usual local anesthetic solutions without epinephrine have produced an anesthesia of such short duration that surgical procedures, as a rule, have been accompanied by pain. The method used has been to give the patient an adequate therapeutic dose of a barbiturate as a premedicant.

The physician usually requests that only a minimal amount of surgery be performed at one time. This practice often is unwarranted and subjects the patient to added hardship. When treating the patient with cardiac disease, it is well for the oral surgeon to outline to his patient's physician a treatment plan based on sound principles.

Thyrotoxic patients, even under the best medical care, are a serious operative risk; and in oral surgery practice this type of patient occasionally needs treatment. Surgery of a minor nature in certain cases may precipitate

cardiac failure or a thyroid crisis. Therefore it is imperative that the oral surgeon operate only when the patient is under the best medical care attainable.

Patients with advanced toxic hyperthyroidism should as a rule be treated in the hospital. Hypertensive patients are usually safe operative risks. If the heart or kidneys have been damaged, every precaution should be taken to prevent an undue rise in blood pressure in order to avoid a cerebral vascular accident. Since hypertensive patients bleed more freely, even if their increased pressure is arterial, a special effort should be made to control any bleeding or oozing at the time of surgery.

The diabetic patient undergoing surgery is six times as likely to die as the diabetic patient who is under medical care only. In elective surgery, delay should be the rule until the disease is controlled or at least until adequate therapy has been instituted. Extensive and prolonged operative procedures should be avoided.

The only type of arthritis that has been found to be specifically influenced by trauma is gout. Although there is no scientific evidence that surgical trauma influences any other acute or chronic type of arthritis, it is generally felt that antibiotics should be used preoperatively and postoperatively when an arthritic process is present.

Individuals who have developed sensitivities to antibiotics are not necessarily sensitive to sulfonamides; these agents are available and usually are safe. In the event that no antiinfective agent can be tolerated, the best supportive care available should be given, with the hope that the defense mechanisms of the body will be adequate. Then the necessary surgery should be performed at the optimal time.

CORRECTION OF PROGNATHISM

Carl F. Anderson and LeRoy Smith, p. 118.

Prognathism is commonly defined as protrusion of the mandible and is frequently a hereditary deformity. It is hazardous to assume that every patient with prognathism might be a potential candidate for surgical correction. The patient's physical condition, his intelligence and his willingness to assume his share of responsibility in the course of treatment should be carefully evaluated. The irresponsible or disinterested patient is no more to be selected for treatment than is the patient with diabetes, a blood dyscrasia or an uncontrolled endocrine disturbance.

In one case the mandibular segments were brought into ideal relationship with the maxillary teeth without the loss of teeth or the severance of the inferior dental nerves and vessels. A satisfactory angle of the mandible was established with an ostectomy. Winter arch bars with elastic traction provided adequate fixation.

THIOPENTAL SODIUM AND THIAMYLAL SODIUM: THEIR USEFULNESS IN THE OFFICE PRACTICE OF ORAL SURGERY

Edward C. Thompson and David C. Hazard, p. 125.

This paper is an examination of the value of thiopental sodium, which now is a widely and successfully used anesthetic agent for oral surgery. The operator should master administration of gaseous anesthetics before undertaking the use of intravenous technics.

The patient is kept in a state beyond analgesia and in a state of amnesia, but he is certainly not anesthetized in the sense accepted by the general surgeon. Balanced anesthesia for long, technical and bloody operations on the jaws, performed when the patient is in either the upright or supine position, can be accomplished. Though initially the patient is anesthetized in a light plane, as the operation progresses he is so "light" that there is little respiratory depression.

In laboratory studies on dogs, Kelly, Shideman and Adams found thiamylal sodium to be 139 per cent as potent as thiopental sodium. Wyngaarden and his co-workers expressed the opinion that the rate of accumulation is a function of the total dose administered, the more potent drugs requiring smaller doses and hence a shorter time for detoxification. Woods and his associates demonstrated that, in equivalent doses, thiamylal sodium is perhaps less and definitely not more toxic than thiopental sodium.

Thiamylal sodium may have a place in oral surgery, primarily because its shorter recovery time should make it valuable in office practice.

RECOGNITION AND MANAGEMENT OF BLEEDING DISORDERS IN ORAL SURGERY

James T. Howell and Raymond W. Monto, p. 129.

Hemorrhagic diseases may represent defects in the blood vessels themselves, they may stem from an abnormality of the cellular elements of the blood, or they may result from defects in the chemical or hormonal components in the blood coagulation mechanism. It is necessary to know the factors which insure hemostasis in the healthy individual. Some of these factors are (1) the tone of the tissues into

which the bleeding occurs, (2) the integrity of the blood vessel wall, (3) the pressure in the vascular system, (4) the constituents of the blood which are responsible for its coagulation.

It has been adequately demonstrated that neither platelet thrombi nor fibrin clots form within the small vessels of capillary and precapillary size, yet platelet plugs characteristically seal the defect in vessels over 55 micra in diameter. An oral surgeon, knowing the basic facts operative in normal hemostasis, must be able to recognize clinically the hemorrhagic syndromes.

The duration of the bleeding is of obvious importance. Significant bleeding usually is continuous and of short duration. The amount of bleeding has to be evaluated. Continuous bleeding often is a more serious type of bleeding than intermittent bleeding of longer duration. Briskly bleeding bright red blood indicates arterial bleeding of local origin, while dark red oozing blood is usually an indication of serious systemic disease.

After the interrogation of the patient, the physical examination is the next important step in the diagnosis of a hemorrhagic disease.

The hemorrhagic diseases can be separated into (1) the group which is platelet deficient or thrombocytopenic and (2) the group in which there is either a vascular or a plasma defect.

There are three preliminary clinical procedures which the internist or hematologist often performs in his office: determination of the bleeding time, determination of the clotting time and the capillary resistance test.

Therapeutic treatment of the hemorrhagic disease may be divided into two large phases, symptomatic and definitive. There are three cardinal principles in the symptomatic management of bleeding: (1) rest, (2) application of cold and (3) application of pressure. There are a number of local measures which can be instituted at the bleeding site.

There is no substitute in major bleeding episodes for a transfusion of fresh whole blood. Rutin and ascorbic acid are medications which are of value to counteract the vascular effects of certain hemorrhagic diseases. Increase in blood heparinoid substances is believed to result from multiple blood transfusions rather than from the basic disease under therapy. Adrenocorticotrophic hormone and cortisone have a nonspecific action in alleviation of abnormal bleeding of vascular origin as well as a specific response in cases of idiopathic thrombocytopenic purpura.

When deficient prothrombin formation or activity can be proved to be the source of hemorrhage, administration of vitamin K can be effective therapy. The routine prophylactic use of vitamin K in bleeding problems cannot be rationalized. Lowered blood calcium levels of a degree to affect the coagulability of blood are not compatible with life.

REMARKABLE TOLERANCE OF TISSUES TO A FOREIGN BODY

Albert H. Throndson, p. 137.

Roentgenographic examinations occasionally reveal the presence of foreign bodies in the tissues without evidence of infection or tissue changes. The question arises as to whether all such objects should be removed as a prophylactic measure or whether they should be noted and allowed to remain undisturbed until symptoms appear that demand their removal.

Several factors, singly or together, cause immediate or delayed reaction in the tissues. One of these factors is infection introduced by or with the foreign body; a second is the nature of the substance constituting the foreign body, which may produce inflammation followed by infection. When the foreign material is sterile, essentially insoluble and but slightly reactive to tissue fluids, the body tolerates it well. Tantalum, Vitallium and polyethylene, for example, produce practically no reaction and for this reason are useful in reconstructive surgery. All factors must be considered before a decision is made as to whether to remove a foreign body.

When the clinical history is relevant, the operator's course is easier since previous infection associated with a foreign mass would make him hesitate to ignore it. Obviously, then, when infection is present, all foreign bodies should be removed unless the patient's health contraindicates surgical intervention. Foreign bodies, even when not bearing infection, should be removed from young individuals as a preventive measure, unless the surgery jeopardizes an otherwise healthy organ or part. In patients of advanced years, absence of symptoms would suggest watchful waiting rather than early operative interference.

QUO VADIS

Richard H. Lyons, p. 140.

Deaths

Adams, Warner S., Shrewsbury, Mass.; Baltimore College of Dental Surgery, 1917; died June 5; aged 70.

Adams, William R., Pittsburgh; School of Dentistry, University of Pittsburgh, 1930; died June 19; aged 46.

Altshuler, Abraham, Boston; Dental School, Harvard University, 1914; died May 19; aged 59.

Anders, Charles G., Omaha; College of Dentistry, Creighton University, 1915; died June 24; aged 67.

Anderson, James A., Syracuse, N. Y.; Pennsylvania College of Dental Surgery, Philadelphia, 1897; died July 15; aged 79.

Arnold, Arthur W., Brooklyn; School of Dentistry, University of Buffalo, 1909; died July 21; aged 68.

Arnold, Carl E., Jackson, Tenn.; School of Dentistry, University of Tennessee, 1922; died May 24; aged 54.

Bailey, Marvin D., Houston, Texas; Texas Dental College, 1920; died May 22; aged 57.

Baker, Albert V., Detroit; Department of Dental Surgery, Detroit College of Medicine, 1905; died May 31.

Beaty, Fred A., Union City, Ind.; Indiana Dental College, 1915; died June 6; aged 62.

Beckett, Herbert P., Providence, R. I.; School of Dentistry, University of Pennsylvania, 1909; died July 22; aged 67.

Behney, Byron S., Harrisburg, Pa.; School of Dentistry, University of Pennsylvania, 1910; died July 8; aged 64.

Bicha, Frank C., Elmwood Park, Ill.; Dental School, Marquette University, 1923; died June 13; aged 53.

Billingslea, Eugene L., Augusta, Ark.; School of Dentistry, Washington University, St. Louis, 1921; died May 19; aged 53.

Black, Louis H., Hubbard, Ohio; College of Dentistry, Ohio Medical University, 1899; died July 13; aged 79.

Bosworth, King A., Tiffin, Ohio; College of Dentistry, Ohio State University, 1909; died May 1; aged 65.

Braafladt, Theodore O., Cloquet, Minn.; College of Dentistry, University of Minnesota, 1904; died April 8; aged 74.

Bradley, Charles D., San Jose, Calif.; College of Dentistry, University of California, 1917; died August 1; aged 59.

Brenner, George P., Hollywood, Fla.; Chicago College of Dental Surgery, Loyola University, 1899; died July 1; aged 77.

Bumgardner, Edward, Lawrence, Kan.; College of Dentistry, University of Iowa, 1891; died June 11; aged 88.

Burton, Isaac H., Woxall, Pa.; died June 24; aged 84.

Campbell, Robert E., Berkeley, Calif.; College of Dentistry, University of California, 1910; died July 1; aged 94.

Carey, James H., Rochester, N. Y.; School of Dentistry, University of Pennsylvania, 1905; died July 5; aged 70.

Carroll, Edmund H., Davenport, Iowa; Chicago College of Dental Surgery, Loyola University, 1915; died May 31; aged 60.

Childs, W. Arthur, Lynn, Mass.; Dental Department, Baltimore Medical College, 1902; died July 17; aged 74.

Choate, Lester M., Gary, Ind.; Indiana Dental College, 1918; died July 13; aged 59.

Christopher, Clay[illegible] R., Syracuse, N. Y.; School of Dentistry, University of Buffalo, 1898; died [illegible] 18; aged 82.

Collins, Wilbur [illegible], Lewisburg, W. Va.; died June 15.

Coriell, Louis D., Baltimore; Baltimore College of Dental Surgery, 1899; died June 17; aged 75.

Cumley, Edward R., Cincinnati; Ohio College of Dental Surgery, University of Cincinnati, 1922; died June 23; aged 54.

Dailey, William B., Akron, Ohio; Baltimore College of Dental Surgery, University of Maryland, 1899; died July 5; aged 80.

Davis, John C., Ottumwa, Iowa; College of Dentistry, University of Iowa, 1901; died June 18; aged 74.

Denney, Reuben E., Philadelphia; Pennsylvania College of Dental Surgery, Philadelphia, 1920; died June 14; aged 74.

Dickenson, James B., Asheville, N. C.; Louisville College of Dentistry of Centre College, 1915; died June 20; aged 69.

Dicks, Orpheus T., Indianapolis; Indiana Dental College, 1901; died June 5; aged 80.

Dieffenbacher, B. L.; Auburn, Calif.; College of Dentistry, University of Iowa, 1904; died May 28; aged 89.

Dowden, James A., Philadelphia; School of Dentistry, University of Pennsylvania, 1896; died May 26.

Dveirin, Hyman E., Denver; School of Dentistry, University of Denver, 1917; died June 7; aged 57.

Edelstein, Francis J., New York; New York College of Dentistry, 1914; died June 7; aged 60.

Edwards, LeRoy S., Brooklyn; New York College of Dentistry, 1903; died June 15; aged 74.

Esser, Joseph C., Seattle; College of Dentistry, University of Iowa, 1914; died May 20.

Eubanks, Richard M., Atlanta, Ga.; Atlanta Dental College, 1911; died June 21; aged 79.

Fink, Arthur E., Cleveland; School of Dentistry, Western Reserve University, 1913; died June 21; aged 62.

Fischer, Henry G., Wayne, Pa.; Philadelphia Dental College, 1899; died July 5; aged 77.

Fitzpatrick, Louis J., Portland, Ore.; School of Dentistry, University of Pennsylvania, 1903; died June 18; aged 72.

Flener, Oscar, Hopkinsville, Ky.; Louisville College of Dentistry of Centre College, 1910; died June 20; aged 66.

Ford, Frank B., Attica, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1898; died June 29; aged 82.

Fox, Barlow, Salt Lake City; Chicago College of Dental Surgery, Loyola University, 1920; died June 15; aged 59.

Gallagher, Joseph E., New Bedford, Mass.; School of Dentistry, Georgetown University, 1934; died June 3; aged 48.

Gallagher, William H., Penndel, Pa.; School of Dentistry, University of Pittsburgh, 1905; died June 14; aged 70.

Goheen, Elmer D., Port Angeles, Wash.; Kansas City Dental College, 1916; died June 30.

Gray, Marion L., Drexel, Mo.; School of Dentistry, Temple University, 1900; died May 17; aged 77.

Grigg, Richard J., Quincy, Mass.; Dental School, Tufts College, 1917; died June 20; aged 62.

Hagelgans, Herbert W., Miami, Fla.; Atlanta-Southern Dental College, 1936; died June 22; aged 42.

Hamilton, Fred L., Fort Worth; Dental Department, Meharry Medical College, 1924; died June 26; aged 54.

Harness, George W., Marietta, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1902; died June 17; aged 74.

Harrelson, Elmer W., Cape Girardeau, Mo.; School of Dentistry, St. Louis University, 1908; died May 27.

Harris, Frank S., Chicago; Chicago College of Dental Surgery, Loyola University, 1918; died in July; aged 59.

Hermann, Jacob, Brooklyn; New York College of Dentistry, 1909; died July 12; aged 66.

Hirezi, Mussa J., Brownwood, Texas; Texas Dental College, Houston, 1929; died June 9; aged 50.

Hogue, Roy V., Glendale, Calif.; School of Dentistry, University of Denver, 1912; died June 21.

Hornick, Ottilie, New York; College of Dental and Oral Surgery, New York, 1907; died May 26.

Huber, Ralph F., Lexington, Ky.; School of Dentistry, University of Louisville, 1935; died July 2; aged 41.

Hughes, Albert P., Harlem, Mont.; School of Dentistry, St. Louis University, 1934; died June 7; aged 42.

Inskipp, Ernest F., San Francisco; College of Physicians and Surgeons, San Francisco, 1931; died July 15.

Irvin, John E., Houston, Texas; Atlanta Dental College, 1897; died in June.

Jackson, Milon B., Skokie, Ill.; Dental School, Northwestern University, 1923; died July 7; aged 55.

Jacobsen, J. Gilbert, Bremerton, Wash.; School of Dentistry, North Pacific College of Oregon, Portland, 1928; died June 23; aged 48.

Jenkins, Horace L., Chattanooga, Tenn.; School of Dentistry, University of Tennessee,1924; died July 4; aged 56.

Karr, Ernest C., Decatur, Ill.; Dental School, Northwestern University, 1916; died June 29; aged 61.

Kelly, Joseph L., Eaton, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1907; died May 31; aged 70.

Kemper, James H., Indianapolis; School of Dentistry, University of Louisville, 1917; died June 10; aged 57.

Kilpatrick, Harold E., Montpelier, Ohio; College of Dentistry, Ohio State University, 1934; died July 7; aged 46.

Kolar, Otto, River Forest, Ill.; died in June; aged 60.

Lane, William D., Willows, Calif.; died June 26; aged 43.

Leach, Russell V., Malta, Mont.; Dental School, Northwestern University, 1919; died in June; aged 66.

Lence, William H., Jonesboro, Ill.; School of Dentistry, Washington University, St. Louis, 1905; died April 16; aged 71.

Leslie, Robert M., Great Falls, Mont.; School of Dentistry, Temple University, 1895; died June 10; aged 90.

Leverett, Charles D., Charleston, S. C.; Southern Dental College, Atlanta, 1910; died July 9; aged 68.

Lindenau, Walter H., Parma, Ohio; School of Dentistry, Western Reserve University, 1928; died May 22; aged 47.

Little, Earle R., Miami, Ariz.; Colorado College of Dental Surgery, 1912; died May 21; aged 73.

MacKinnon, Tennyson W., Framingham, Mass.; Dental School, Tufts College, 1928; died May 30; aged 50.

MacNamee, Herbert, Washington, D. C.; Dental Department, Columbian University, 1894; died June 26; aged 86.

Madden, James W., Madison Wis.; Dental School, Northwestern University, 1898; died May 1; aged 77.

Maddux, Nathaniel P., Asheville, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1909; died in July.

Mapes, Howard M., Three Rivers, Mich.; College of Dental Surgery, University of Michigan, 1927; died July 2; aged 49.

Martin, Winfred P., Centerville, Iowa; Kansas City-Western Dental College, 1923; died June 8; aged 54.

Mathieson, Robert M., Homer City, Pa.; School of Dentistry, University of Pittsburgh, 1927; died June 18; aged 50.

McCanless, George R., Bogota, N. J.; Atlanta-Southern Dental College, 1929; died July 26; aged 49.

McClinton, Ray, Burlingame, Calif.; College of Dentistry, University of California, 1902; died May 29; aged 77.

McFarland, Gerald M., Houston, Texas; died July 15; aged 39.

McGill, Gertrude, Seattle; Western Dental College, Kansas City, 1904; died June 30.

McKinney, Curtis S., Excelsior Springs, Mo.; Western Dental College, Kansas City, 1915; died May 21; aged 62.

Meador, Thomas J., Red Boiling Springs, Tenn.; College of Dentistry, University of Tennessee, 1915; died June 3; aged 64.

Meeker, Mahlon I., Pocatello, Idaho; died May 20.

Melanson, Joseph R., Arnaudville, La.; died May 2; aged 76.

Miles, Charles T., Stone Harbor, N. J., School of Dentistry, University of Pennsylvania, 1914; died June 22; aged 59.

Miller, Elliott S., Denver; Denver College of Dentistry, 1896; died May 7; aged 85.

Miller, Roy C., Sandwich, Ill.; Chicago College of Dental Surgery, Loyola University, 1910; died April 27; aged 69.

Parmenter, Elza W., McCook, Neb.; Lincoln Dental College of Cotner University, 1909; died May 28.

Pollina, Vincent J., Framingham, Mass.; Dental School, Tufts College, 1915; died June 25; aged 72.

Preo, Herbert E., Berlin, N. H.; Atlanta Dental College, 1915; died May 9; aged 62.

Riedel, William J. M., Lyndhurst, Ohio; School of Dentistry, Western Reserve University, 1913; died May 24; aged 61.

Riley, John M., St. Joseph, Mo.; Kansas City Dental College, 1911; died May 25; aged 72.

Rinckel, Edward J., Carson City, Nev.; College of Dentistry, University of California, 1901; died June 14; aged 73.

Rosenberg, Samuel Y., Chicago; Chicago College of Dental Surgery, Loyola University, 1935; died June 23; aged 40.

Shramek, John F., Wilber, Neb.; College of Dentistry, Creighton University, 1925; died May 17; aged 52.

Simpson, John E., Duluth, Minn.; College of Dentistry, University of Minnesota, 1915; died June 23; aged 59.

Slaton, John T., Lexington, Ky.; Philadelphia College of Dental Surgery, 1902; died June 4; aged 77.

Vaughn, John W., Burlingame, Kan.; Kansas City Dental College, 1895; died in August; aged 80.

Warren, David J., Detroit; School of Dentistry, University of Detroit, 1936; died June 5; aged 40.

Watson, G. Wallace, Passaic, N. J.; College of Dentistry, New York University, 1894; died May 27; aged 80.

Watts, William, Sonoma, Calif.; School of Dentistry, University of Pennsylvania, 1909; died June 25; aged 69.

Weaver, Ben Shaw, Butte, Mont.; Kansas City-Western Dental College, 1926; died May 30; aged 54.

Weir, Frank B., Wichita, Kan.; Western Dental College, Kansas City, 1902; died May 30; aged 76.

Weller, Samuel V., Jacksonville, Ill.; Dental School, Northwestern University, 1938; died June 1; aged 41.

Wiecek, Michael F., Cleveland; College of Dentistry, University of Illinois, 1927; died June 3; aged 56.

Williams, Charles C., Fresno, Calif.; College of Dentistry, University of Southern California, 1904; died June 30; aged 75.

Williams, Edward E., Davenport, Iowa; Chicago College of Dental Surgery, Loyola University, 1890; died June 12; aged 85.

Wilson, Orlie D., Owensboro, Ky.; Louisville College of Dentistry of Centre College, 1904; died May 18; aged 72.

Wilson, Will S.; Fairfield, Ala.; Atlanta-Southern Dental College, 1919; died June 18; aged 59.

Wooton, George H., Akron, Iowa; College of Dental Surgery, University of Michigan, 1896; died June 25; aged 81.

Yeo, Eugene H.; East Lynn, Mass.; Dental School, Tufts College, 1909; died June 24; aged 67.

Youngfleish, Jerome J.; Norristown, Pa.; School of Dentistry, Temple University, 1926; died July 7; aged 49.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Fifth Annual Session	Nov. 8-11, 1954	Miami, Fla.
Ninety-Sixth Annual Session	Oct. 17-20, 1955	San Francisco
Ninety-Seventh Annual Session	Oct. 1-4, 1956	Atlantic City, N. J.

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 25-27	Biloxi, Miss.	F. A. Finney, Jr.	1045 Forrest Ave., Gadsden
Alaska	June 20	Mt. McKinley National Park	C. J. Pearson	500 K St., Anchorage
Arizona	Apr. 21-24	Phoenix	E. M. Scott	17 E. Weldon Ave., Phoenix
Arkansas	Apr. 4-7	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 26-28	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California	May 3-5	Los Angeles	J. P. Bowers	124 W. Lime Ave., Monrovia
Colorado	Oct. 3-6	Colorado Springs	W. R. Humphrey	724 Republic Bldg., Denver
Connecticut	June 2-4	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware	Jan. 13	Wilmington	J. C. Baker	Mayfair Apts., Sec. C., 1300 Harrison St., Wilmington
District of Columbia	June 8	Washington	Z. B. Lloyd	2007 R St., N.W., Washington
Florida	Apr. 25-28	Daytona Beach	B. S. Carroll	706 Professional Bldg., Jacksonville
Georgia	Oct. 10-13	Atlanta	J. W. Yarbrough	Bibb Bldg., Macon
Hawaii	June 23-26	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	Apr. 29, 30	Boise	C. G. Hanson	409 11th Ave., S., Nampa
Illinois	May 10-13	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria
Indiana	May 17-19	Indianapolis	E. E. Ewbank	Box 96, Kingman
Iowa	May 3-5	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 16-19	Wichita	F. A. Richmond	861 Brotherhood Bldg., Kansas City
Kentucky	Apr. 5-7	Louisville	A. B. Coxwell, Jr.	1976 Douglass Blvd., Louisville
Louisiana	Apr. 21-24	Baton Rouge	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June 24-26	Rockland	S. M. Gower	Box 27, Skowhegan
Maryland	May 3-5	Baltimore	E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore
Massachusetts	May 2-5	Boston	H. E. Tingley	12 Bay State Road, Boston
Michigan	Apr. 25-28	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Feb. 22-24	St. Paul	C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi	June 5-8	Biloxi	B. A. Cohen	306 Plaza Bldg., Jackson
Missouri	June 13-16	St. Louis	E. D. Suggett	201 Merchants Bank Bldg., Jefferson City
Montana	May 6-8	Great Falls	E. G. Vedova	Roundup
Nebraska	May 10-12	Omaha	F. A. Pierson	1112 Federal Securities Bldg., Lincoln
Nevada	June 18-20	Reno	O. M. Seifert	506 Humboldt St., Reno
New Hampshire	June 13-15	Whitefield	F. E. Williams	814 Elm St., Manchester
New Jersey	May 4-6	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 23-26	Santa Fe	J. S. Ellar	Medical Arts Square, Albuquerque
New York	May 10-12	Buffalo	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 16-19	Pinehurst	R. D. Coffey	Kibler Bldg., Morganton
North Dakota	May 23-25	Bismarck	V. B. Keltgen	517 de Lendrecie Bldg., Fargo
Ohio	Oct. 17-20	Cincinnati	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 20-23	Oklahoma City	D. Robertson	434 N.W. 13th St., Oklahoma City
Oregon	Mar. 1-3	Portland	W. H. Hurley	308 Selling Bldg., Portland
Panama Canal Zone			C. F. Atkins	DC, USA, Box 115, Rodman
Pennsylvania	Oct. 5-7	Pittsburgh	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	Jan. 28-30	San Juan	F. Ordoñez	1558 Ponce de León Ave., Stop 23, Santurce
Rhode Island	Jan. 17, 19, 20	Providence	N. G. Migliaccio	1467 Westminster St., Providence

State	Date	Place	Secretary	Address
South Carolina	May 23-25	Columbia	J. R. Owings	7 Medical Court, Greenville
South Dakota	May 20-22	Sioux Falls	L. N. Thelen	310A W. 18th St., Sioux Falls
Tennessee	May 10-12	Chattanooga	W. L. McCulley	Brown Bldg., Cleveland
Texas	Apr. 25-29	Dallas	W. Ogle	3607 Gaston Ave., Dallas
Utah	Apr. 8-10	Salt Lake City	K. L. Dedekind	914 Medical Arts Bldg., Salt Lake City
Vermont	May 16-18	Woodstock	W. J. Reardon	18 Madison St., Rutland
Virginia	Apr. 12-14	Richmond	W. T. McAfee	705 Colonial National Bank Bldg., Roanoke
Washington	Mar. 25-27	Seattle	W. B. Martin	Medical-Dental Bldg., Seattle
West Virginia	July 25-28	White Sulphur Springs	G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 20-22	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming	June 20-23	Rock Springs	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 21-24	Birmingham	W. L. McCarty	200 Professional Center, Montgomery
Alaska			P. H. Williams	Box 2122, Juneau
Arizona			R. K. Trueblood	107 East A Ave., Glendale
Arkansas	Jan. 12-16*†	Little Rock	H. O. Weatherly	205 Halter Bldg., Conway
	June 21-25*†			
California	Feb. 8	San Francisco	K. I. Nesbitt	507 Polk St., San Francisco
	June 21	Los Angeles		
	July 26	San Francisco		
Colorado	June 21-25	Denver	C. K. Phillips	724 Republic Bldg., Denver
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. T. Birthright	1835 Eye St., N.W., Washington
Florida	July 12-22*†	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			S. H. Yarbrough	12 Medical Arts Bldg., Columbus
Hawaii			H. L. Houvener	427 Dillingham Bldg., Honolulu
Idaho			R. E. Blickenstaff	1023 Fourth St., S., Nampa
Illinois			W. A. McKee	503 Wood Bldg., Benton
Indiana			C. A. Frech	504 Broadway, Gary
Iowa	May 24-28*†	Iowa City	D. J. FitzGerald	615 Brick & Tile Bldg., Mason City
Kansas	Jan. 18-21*†		G. L. Teall	Box 71, Hiawatha
Kentucky	June 7-10	Louisville	R. M. Justice	1330 Central Ave., Ashland
Louisiana			R. C. Steib	833 Maison Blanche Bldg., New Orleans
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland	June 7-9		H. Levin	3429 Park Heights Ave., Baltimore
Massachusetts	June 21-25*		R. A. Barrette	Rm. 33, State House, Boston
	June 23-25†			
Michigan	Jan. 24-30	Ann Arbor	J. L. Champagne	3714 W. McNichols Road, Detroit
	June 6-12			
Minnesota	Jan. 4-8	Minneapolis	M. G. Walls	1470 Lowry Medical Arts Bldg., St. Paul
	June 14-18			
Mississippi	Jan. 4-6	Jackson	J. C. Boswell	508 Lamar Life Bldg., Jackson
	June 15-17			
Missouri			R. R. Rhoades	414 Central Trust Bldg., Jefferson City
Montana			V. J. Quinn	301 Phoenix Bldg., Butte
Nebraska			H. E. Weber	1210 Federal Securities Bldg., Lincoln
Nevada			R. Whitehead	Suite 6, Masonic Temple, Reno
New Hampshire			S. G. Markos	334 Central Ave., Dover
New Jersey			W. A. Wilson	150 E. State St., Trenton
New Mexico			J. J. Clarke, Sr.	Artesia
New York	Feb. 11†‡		D. W. Beier	23 S. Pearl St., Albany
	Feb. 11, 12*‡			
	Feb. 16, 17†‡			
	Feb. 16-19*‡			
North Carolina	June 28-July 2	Chapel Hill	F. O. Alford	1109 Liberty Life Bldg., Charlotte
North Dakota	July 12-16	Fargo	A. L. Pushor	Lisbon
Ohio			H. B. Smith	336 E. State St., Columbus
Oklahoma			R. P. Keidel	403 Surety Bldg., Muskogee
Oregon			F. L. Utter	506 Pioneer Trust Bldg., Salem
Pennsylvania			A. M. Stinson	Dept. of Public Instruction, Box 911, Harrisburg
Puerto Rico			J. Mercado C.	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence

State	Date	Place	Secretary	Address
South Carolina			T. C. Sparks	1315 Pickens St., Columbia
South Dakota			H. T. Aker	Canton
Tennessee			F. S. Maxey	804 Bennie Dillon Bldg., Nashville
Texas			R. T. Weber	312 Capital National Bank Bldg., Austin
Utah			N. E. Munk	201 Cache Valley Bank Bldg., Logan
Vermont			F. A. Reid	Windsor
Virginia	June 14-18* June 14-16†	Richmond	J. M. Hughes	715 Medical Arts Bldg., Richmond
Washington			M. L. Mower	National Bank of Commerce Bldg., Olympia
West Virginia			C. A. Laughlin	613 Prunty Bldg., Clarksburg
Wisconsin	Jan. 11-15*†	Milwaukee	S. F. Donovan	Tomah
Wyoming			W. A. Hocker	212 O & S Bldg., Casper

*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations. §Approximate dates—verify with state dental examining board.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Denture Prosthetics	Apr. 11	Miami Beach, Fla.	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
American Academy of Implant Dentures	Feb. 7	Chicago	P. S. Loechler Secy.	1924 Thomas Lane, Augusta, Ga.
American Academy of Oral Pathology	Feb. 7	Chicago	J. L. Bernier Secy.	Armed Forces Institute of Pathology, 7th St. and Independence Ave., S.W., Washington, D.C.
American Academy of Restorative Dentistry	Feb. 6, 7	Chicago	A. G. James Secy.	409 N. Camden Drive, Beverly Hills, Calif.
American Association of Dental Schools	Mar. 22-24	French Lick, Ind.	M. W. McCrea Secy.	Baltimore College of Dental Surgery, University of Maryland, Baltimore
American Association of Endodontists	Feb. 6, 7	Chicago	V. B. Milas Secy.	2559 W. 63rd St., Chicago
American Association of Orthodontists	May 16-20	Chicago	F. A. Squires Secy.	Medical Centre, White Plains, N. Y.
American Board of Orthodontics	May 11-15	Chicago	C. E. Martinek Secy.	661 Fisher Bldg., Detroit
American Board of Prosthodontics	Feb. 1-7	Kansas City, Mo.	S. H. Payne Secy.	University of Buffalo, School of Dentistry, Buffalo
American Dental Society of Europe	July 6-9	Paris, France	J. P. Molony Hon. Secy.	110 Harley St., London W.1, England
American Denture Society	Feb. 6, 7	Chicago	A. L. Roberts Secy.	Aurora National Bank Bldg., Aurora, Ill.
American Society for the Advancement of General Anesthesia in Dentistry	Mar. 22	New York	M. H. Feldman Exec. Secy.	730 Fifth Ave., New York
American Society of Oral Surgeons	Nov. 3-6	Miami, Fla.	R. F. Whalen Exec. Secy.	1112 E. Clay St., Richmond, Va.
Chicago Dental Society	Feb. 7-10	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Cincinnati March Clinic Meeting	Mar. 21-23	Cincinnati	P. McMullen Exec. Secy.	123 E. Sixth St., Cincinnati
Council on Dental Education, Dental Aptitude Tests	Mar. 5, 6		S. Peterson Secy.	222 E. Superior St., Chicago
Dallas Mid-Winter Dental Clinic	Jan. 24-27	Dallas	W. C. McCaskill, Jr. Chm.	1329 Medical Arts Bldg., Dallas, Texas
Denver Dental Association, Midwinter Meeting	Jan. 10-13	Denver	H. L. Harris Secy.	724 Republic Bldg., Denver
District of Columbia Dental Society Postgraduate Clinic	Mar. 14-17	Washington	Z. B. Lloyd Secy.	2007 R St., N.W., Washington
Federation Dentaire Internationale	June 10	The Hague, Netherlands	G. H. Leatherman Secy. Gen.	35, Devonshire Place, London W.1, England
Greater Philadelphia Annual Meeting	Feb. 3-5	Philadelphia	R. Adams Secy.	337 Bellevue-Stratford Hotel, Broad and Walnut Sts., Philadelphia
International Association for Dental Research	Mar. 19-21	French Lick, Ind.	E. H. Hatton Secy.	311 E. Chicago Ave., Chicago
National Board of Dental Examiners	Mar. 29, 30		G. J. Casey Secy.	222 E. Superior St., Chicago
Ninth Pacific Coast Dental Conference	June 1-5	Banff, Alberta, Can.	H. B. Powell Secy.	Greyhound Bldg., Calgary, Alberta, Can.
Southeastern Academy of Prosthodontics	Mar. 20, 21	Atlanta, Ga.	R. W. Durham Secy.	1001 Bankers Insurance Bldg., Macon, Ga.
Southern Academy of Oral Surgery	Mar. 12-14	Savannah, Ga.	R. F. Sullivan Secy.	118 Jones St., E., Savannah, Ga.
Southern Academy of Periodontology	Mar. 28-30	New Orleans	E. L. Banks Secy.	Candler Bldg., Atlanta, Ga.
Thomas P. Hinman Mid-Winter Clinic	Mar. 21-24	Atlanta, Ga.	S. Holbrook Exec. Secy.	15 Peachtree Place, N.W., Atlanta, Ga.

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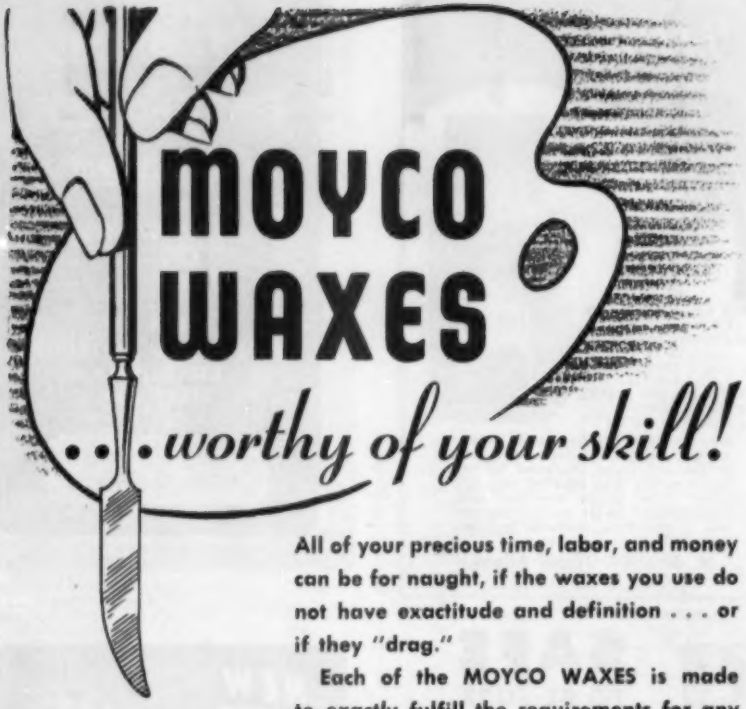

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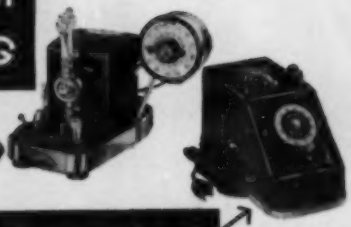

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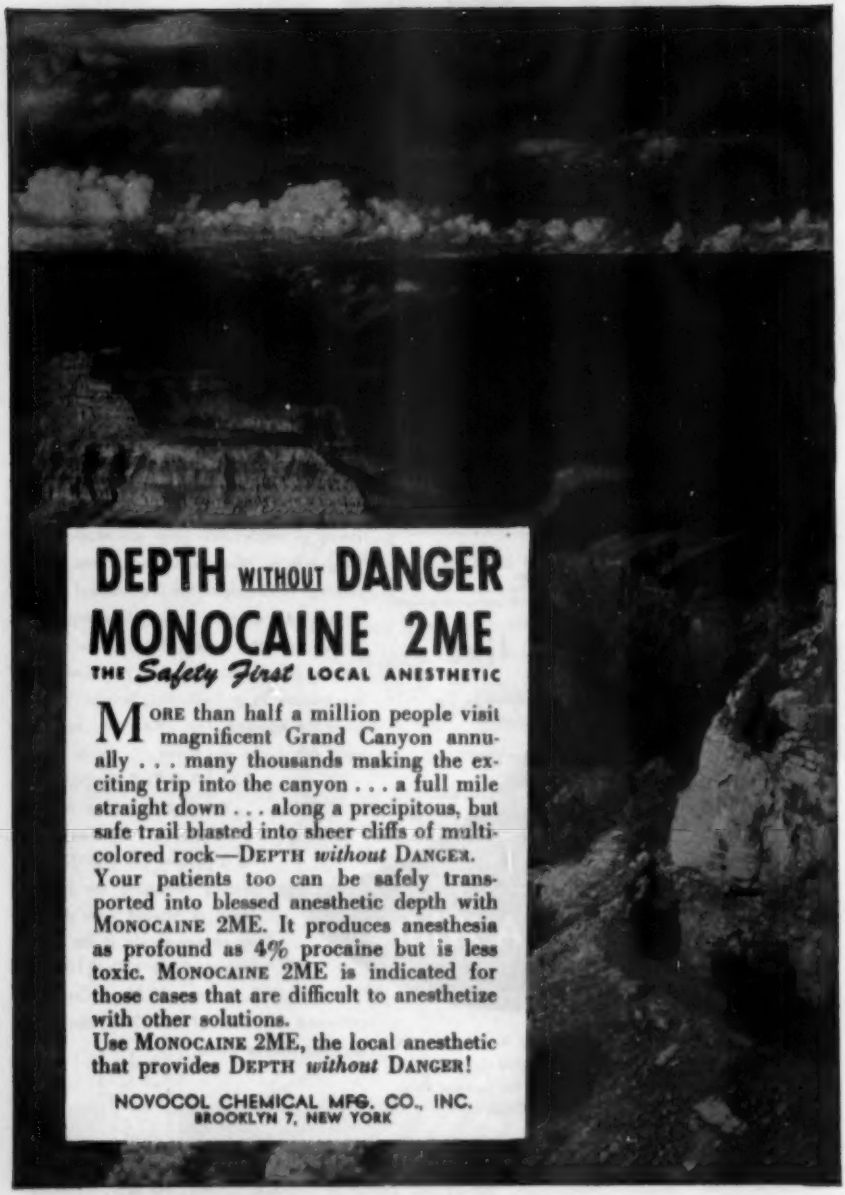
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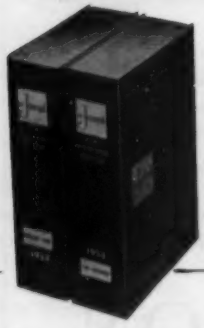

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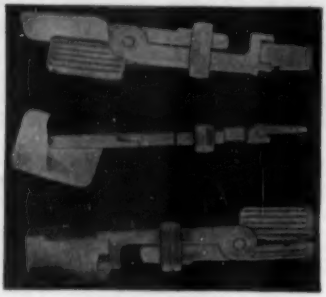

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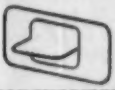

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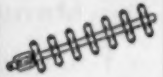

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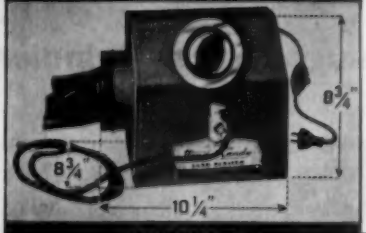

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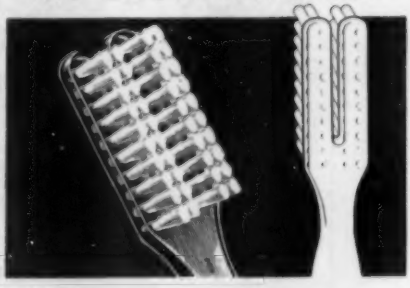

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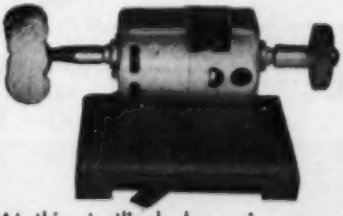

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An alginate tin-foil substitute for acrylic separation. Film-Ac forms a continuous film on investment surfaces (plaster or stone)—never on teeth or metallic surfaces.

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HOW YOU CAN BETTER MATCH THE PATIENT'S NATURAL TEETH

If each of your patients is to receive the service he or she expects and deserves, it is very important that you give all factors in *denture construction* your full consideration. One of the chief factors is determining proper Tooth Selection.

WHICH TEETH? Ninety years of experience leads us to the firm belief that plastics are now the best material for artificial teeth.

RESEARCH HAS SUCCEEDED, even though fourteen years of endeavor have not been without problems. But now the facts are proved from practical experience.

THOUSANDS OF DENTAL PRACTICES, dental schools and clinics attest to the fact that several million sets of S-R teeth have been serving up to four years in a superior manner. We base our conclusions on these facts:

They are the most beautiful, lifelike teeth made—according to many dentists as well as patients.

They are extremely adaptable to natural arrangements.

Fracture is almost unknown.

They help reduce denture adjustments.

They are kind to ridges.

Repair service is reduced to a minimum.

Be sure to note list of
OTHER JUSTI QUALITY-PROVED PRODUCTS
on opposite side of this page

90th YEAR OF SERVICE TO THE PROFESSION

It is our further belief that all plastics used today for the manufacture of artificial teeth are good.

The point is—

Justi Offers More Molds And Shades

S-R Teeth ®

14 SHADES

72 MOLDS

36 Upper Anteriors

10 Lower Anteriors

8 Anatomical Posteriors

8 Long Posteriors

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Plus . . . **33% More Retention Area**

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20

Years of Achievement

In the history of dentistry, twenty years is not a long time. Yet in the life span of chrome alloys, it is almost total.

Ticonium celebrates a twenty-year anniversary this year. In looking back, we are proud of our association with a wonderful profession and are also proud of our contributions to dental prosthetics.

Our goal for the future: All Ticonium research, technical and sales developments are aimed toward ever seeking "What's New."

Ticonium

dentistry's most "fitting" alloy!

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Fine grain
Inlay accuracy
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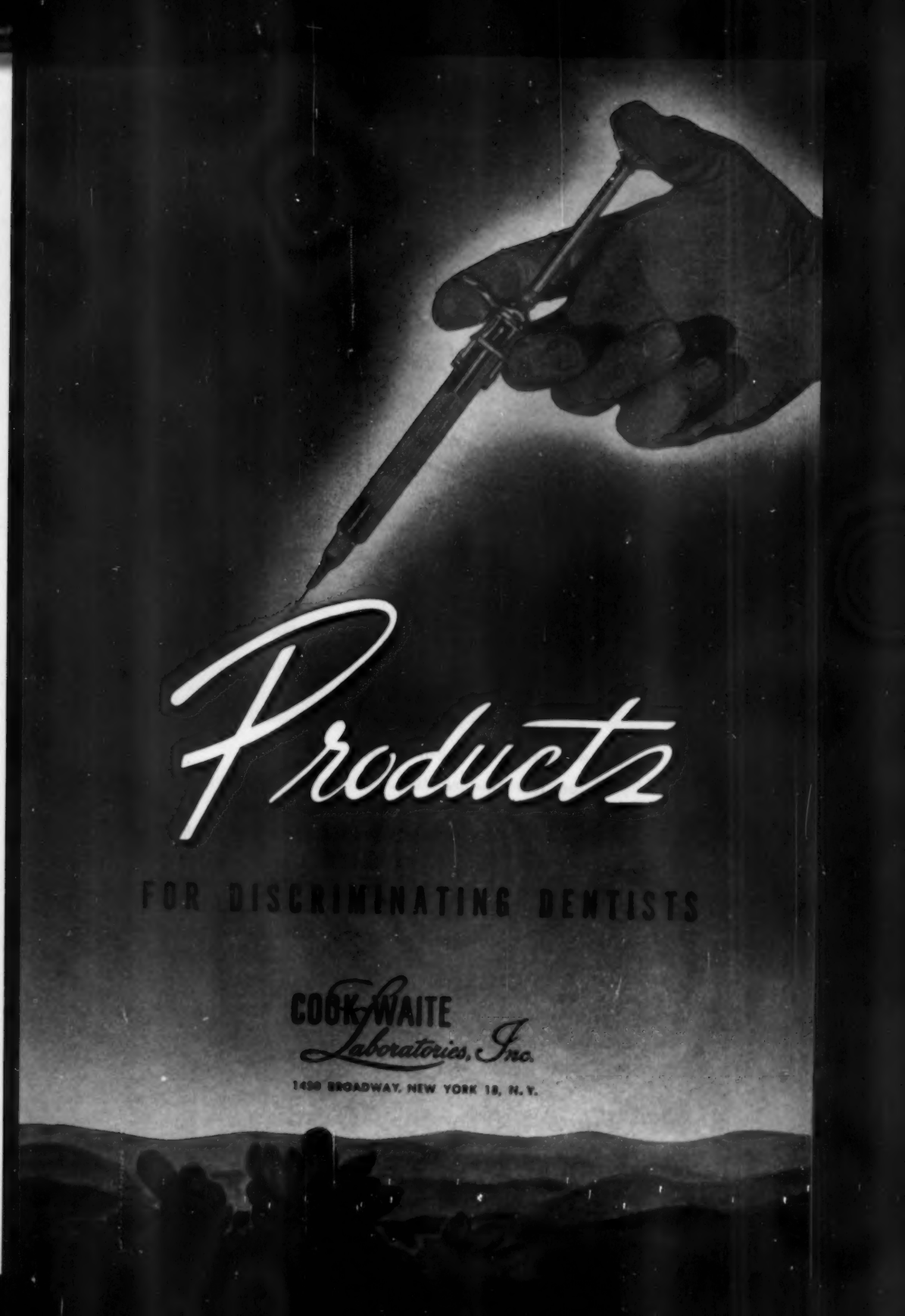
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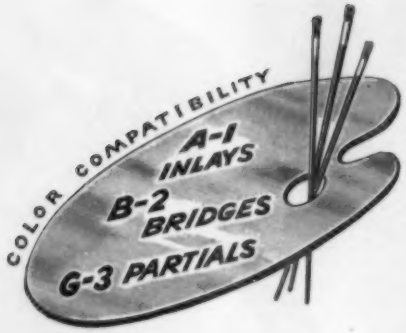

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For Ash forceps – hand forged by master craftsmen from the finest stainless steel available – are famous for their perfect balance and rugged durability. For over 130 years, genuine Ash forceps have remained unmatched in workmanship and design.

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Craze-resistant denture resin eliminates trial packing . . . and resulting hazards of open bite and distortion

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Tested — A product of Myerson research and of more than five years of accumulated clinical experience

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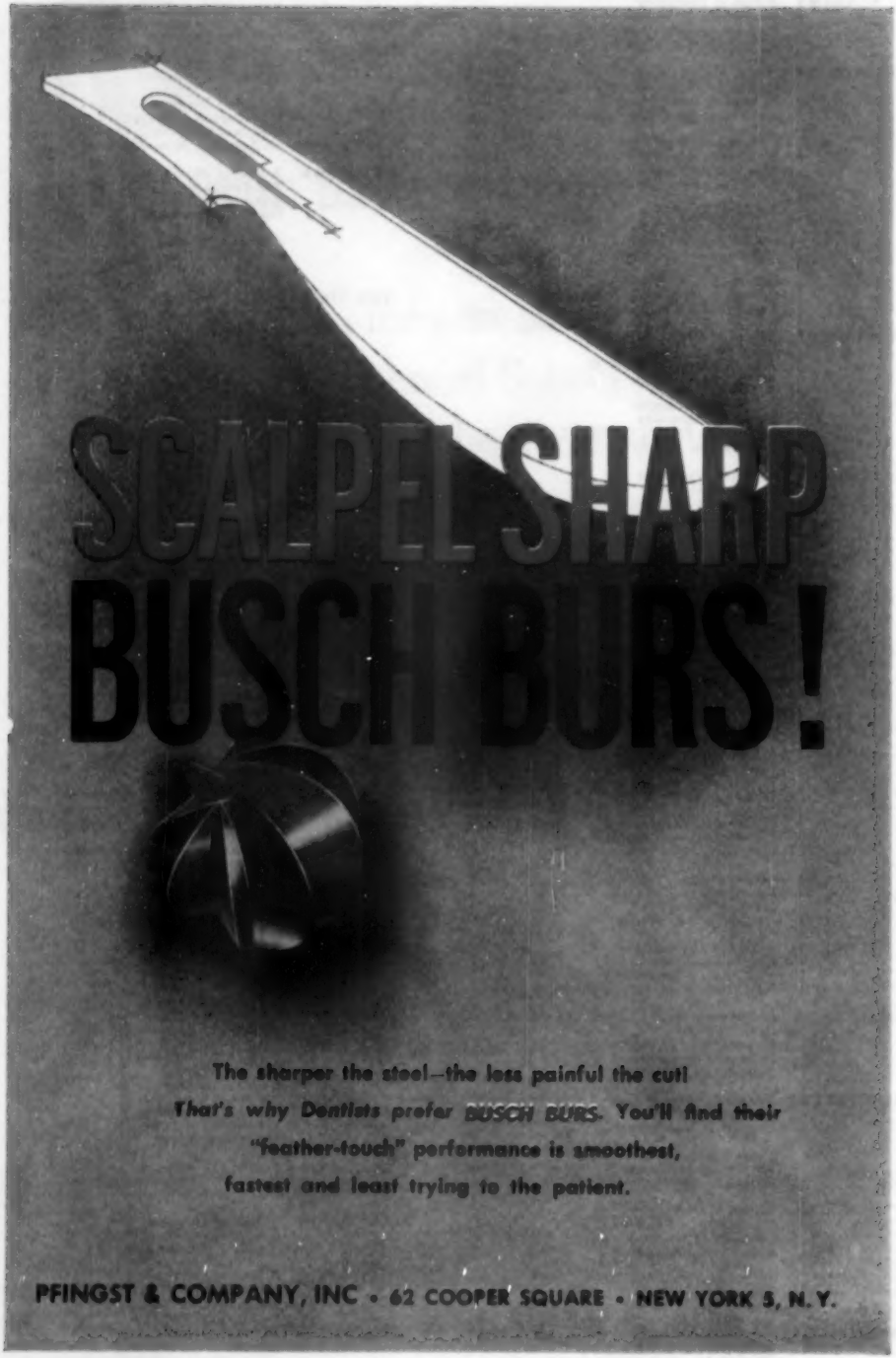
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Grasp handy green tab; pull part way out of packet.

Grasp inner lining; slide it out of packet.

Remove film from paper lining and dip to rack.

"ANDY TAB" SAYS—

In clipping several exposed dental x-ray films to the hanger for development in a solution which has been used for some time, it is a good practice to attach the films from the bottom of the rack upward. If the level of the developer in the tank has become low, this will insure that all of the films are completely immersed in the solution.

●

If some of your dental radiographs are fogged and you suspect that the darkroom safelight may not be as safe as it should be, here is an easy way to test it. Open a dental packet and pull the film halfway out, folding back the tabs and protective paper. Place the packet where developing hangers are loaded and expose film for the time required to rack a full mouth series. Then, develop the test film. If fog shows on the unprotected half of the film the light source is unsafe and should be reduced or replaced with a new one.

●

When positioning dental x-ray film packets in the patient's mouth, avoid bending them sharply, as this may cause kink marks, which appear as black crescents or lines on the processed films.

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Lightning-Fast—designed for long-cone technique. Fastest dental x-ray film available.

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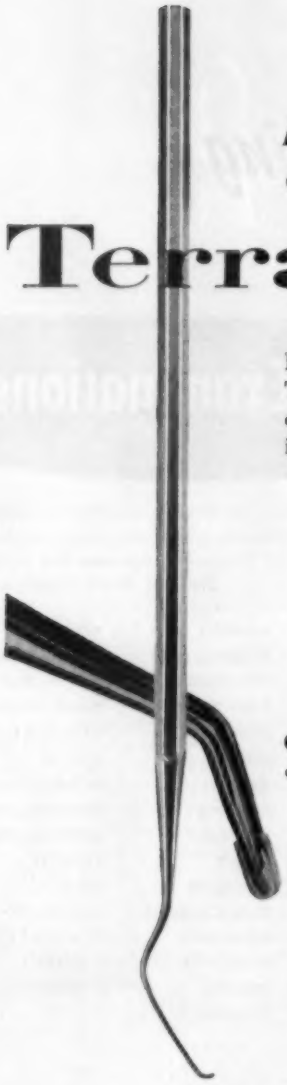

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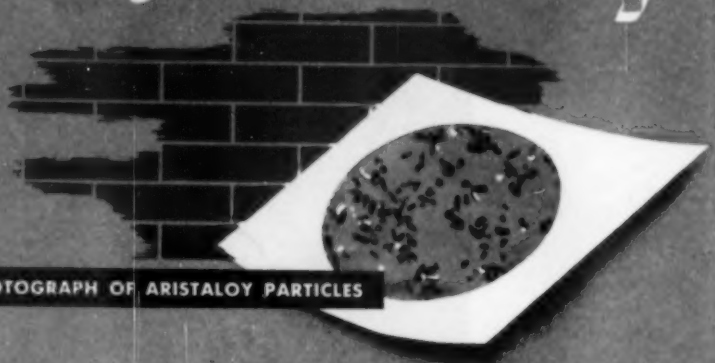

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There is unsurpassed patient appeal in a Vitallium denture, and no other phase of the Vitallium technique imparts more patient appeal than finishing and polishing. Similarly there is no dental casting alloy which will assume a smoother surface or higher permanent lustre than the tested and certified Vitallium alloy.

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MEMO *from Caulk*

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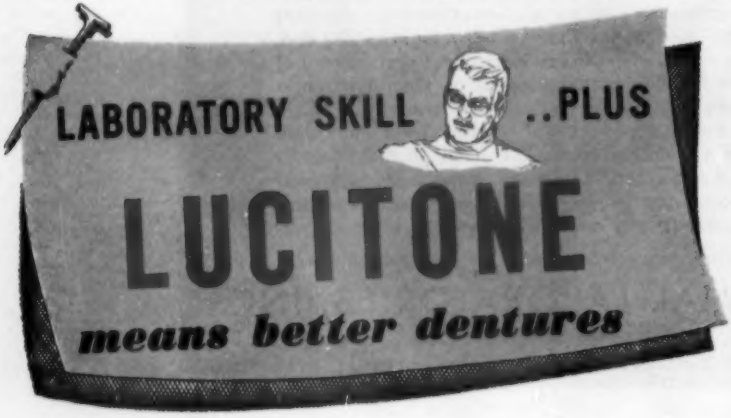
P. S. - Ask your laboratory about the exceptionally lifelike appearance of dentures characterized with LUCITONE COLORBLEND



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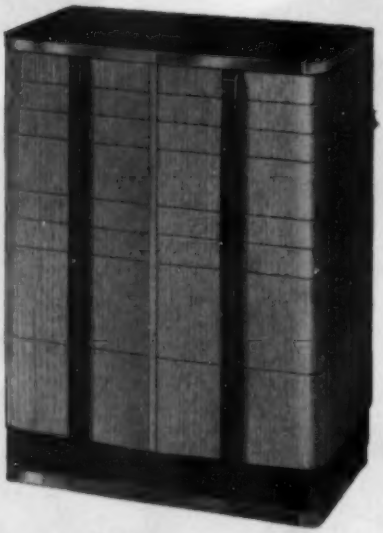
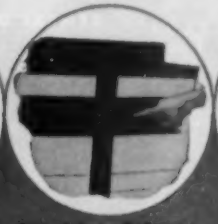
AMERICAN CABINET

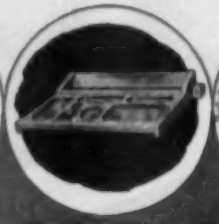


American Cabinets — and the *world's* finest! — with a choice as varied as your needs: stationary and mobile units, from compact 8-drawer to commodious 16-drawer cabinets. Fitted with glass trays, bottles, silicate and cement inserts. Available in five beautiful *Color-tone* finishes. Masterfully crafted to make your office a pleasure to see and work in! Let your dealer show you these exceptional cabinets soon.

Concealed working compartment opens at a touch of a button.



Steel wood-front drawers never warp, stick or jam. Patented covers seal contents against dust.



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Certain cabinets contain lead-lined X-Ray film box.

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Dr.

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For your new denture patient, the highroad to denture mastery offers real hazards, too . . . hazards that can distressingly hinder the progress of adjustment. That's why so many appreciate the suggestion of Wernet's Powder during the period of adaptation.

The improvement in stability and retention afforded by Wernet's Powder can often make the difference between a "difficult" patient and a "successful" patient . . . particularly if anatomical handicaps or psychological difficulties aggravate the problem. And for all patients, its soft resilient cushion helps reduce initial discomforts, and encourages persistence during the learning process.

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WERNET DENTAL LORE

JANUARY, 1954

If a Neanderthal Man were (miraculously) to wander into a modern dentist's office for dental treatment, would the dentist be non-plussed? He might indeed by the patient, but certainly not by the dental problem; for—strange as it may seem—the size of the human jaw, and the number and size of the teeth, have not changed during the intervening 500 or 600 centuries, nor has the proclivity for abnormalities or irregularities, including supernumerary, retained, unerupted, or impacted teeth.

• • •

Many dental theories have clung tenaciously to men's minds—only to fall eventually in the continuing search for truth. The idea, for instance, that toothache was caused by worms gnawing at the teeth—which came down from prehistoric times and was generally considered a scientific fact even as late as the eighteenth century—did not collapse until Fauchard (1678-1761) put an end to it. And the concept of the *humoral* nature of pathology fostered by Empedocles, Hippocrates, Galen and Aristotle—the idea that "temperamental impresa" was one of the causes of variation in tooth form—continued to be taught by dentistry even as late as 1910, before being finally discredited.

• • •

Celsus (B.C. 25-50 A.D.), author of the famous *De Medicina*, was the earliest of Roman writers to mention the filling of teeth—recommending the use of lint or lead. However, he practiced this *not* for the preservation of the teeth, but to facilitate their extraction by preventing breakage under the forceps.

• • •

Sacred relics have been treasured throughout ages; but none has ever been considered more important, nor guarded more closely, than the sacred tooth of Buddha. Locked securely in seven caskets, one inside the other, it is removed only once during the year, for the August "Festival of the Elephants"—and then promptly returned to its nested and multi-locked resting place.

• • •

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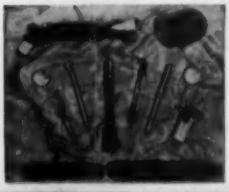

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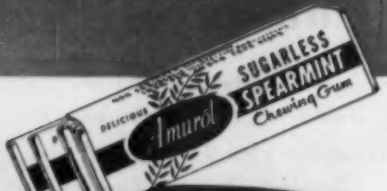

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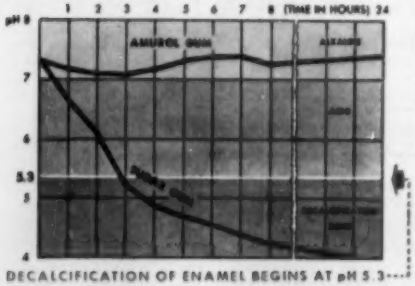

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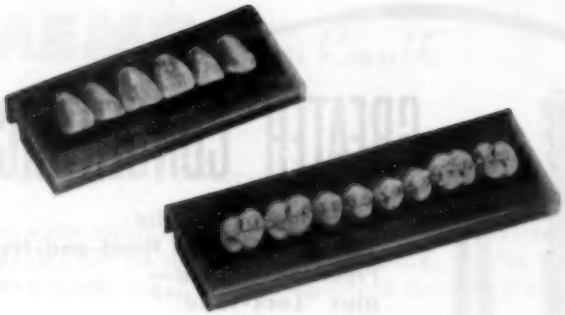

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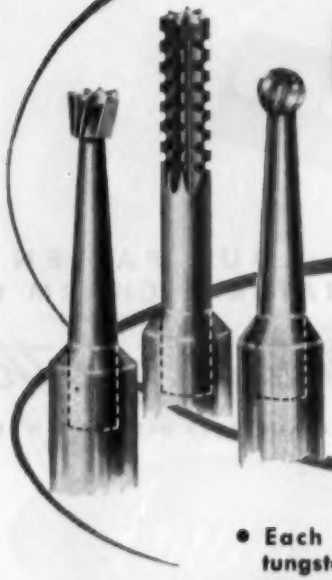

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